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Table of Contents.

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ORIGINAL ARTICLES—

| | |
|---|-----|
| Obstetrical Obstacles, by H. STANLEY WATERS, M.B., B.S. | 771 |
| An Evolutionary Factor in Parturition: The Law of the Split Pelvis, by C. D. GILLIES, M.Sc., M.B., B.S. | 778 |
| "O" Agglutinins for <i>Bacillus Proteus</i> XK in Endemic Typhus of North Queensland, by R. Y. MATHEW, M.B., B.S. | 782 |
| Surgery at Sea in the Eighties, by R. SCOT SKIRVING | 783 |
| Preliminary Treatment in Relation to the Therapeutic Irradiation of Mouse Tumours, Part I, by WARNFORD MOPPETT, M.D., Ch.M. | 785 |

REPORTS OF CASES—

| | |
|---|-----|
| Appendicitis in a Femoral Hernia, by E. WOODALL GAULT, M.D., M.S., F.R.A.C.S., and EDNA I. BAYLIS, M.B., B.S. | 789 |
| A Fatal Case of Asthma in Infancy, by MICHAEL KELLY, M.B., B.S. | 790 |

REVIEWS—

| | |
|----------------------|-----|
| Progress in Medicine | 790 |
| High Blood Pressure | 790 |

LEADING ARTICLES—

| | |
|-----|-----|
| Man | 791 |
|-----|-----|

OBSTETRICAL OBSTACLES.¹

By H. STANLEY WATERS, M.B., B.S. (Melbourne),
Brisbane.

At the commencement of this short paper I desire to emphasize the loss this Section has suffered in the decision of Dr. Elliot-Smith, our late President, to return to Sydney; and that loss, I am afraid, will be accentuated further tonight, when you will hear what might be termed a reiteration of the commonplace, instead of the erudite oration that would assuredly have flown from the scholarly lips of our Past-President.

At the present phase of our history, which is signalized by the practice of birth control and voluntary limitation of families, it is of national

¹ Presidential address delivered before the Obstetrical Section of the Queensland Branch of the British Medical Association on February 4, 1936.

CURRENT COMMENT—

| | |
|--|-----|
| Still-Chauffard's Syndrome | 793 |
| The Relative Safety of Anæsthetics | 793 |
| Twenty-Five Years of Medical Inspection of Schools in Victoria | 795 |
| Carcinoma of the Tongue in a New-Born Child | 795 |

ABSTRACTS FROM CURRENT MEDICAL LITERATURE—

| | |
|------------------|-----|
| Radiology | 796 |
| Physical Therapy | 797 |

MEDICAL SOCIETIES—

| | |
|----------------------------------|-----|
| The Melbourne Paediatric Society | 798 |
|----------------------------------|-----|

OBITUARY—

| | |
|------------------------|-----|
| Charles Edward Marsden | 801 |
|------------------------|-----|

NEW MEDICAMENTS, APPARATUS, ETC.—

| | |
|-------------------------------|-----|
| "Neo-Synephrin Hydrochloride" | 801 |
|-------------------------------|-----|

BOOKS RECEIVED

| | |
|---------------------|-----|
| DIARY FOR THE MONTH | 802 |
|---------------------|-----|

MEDICAL APPOINTMENTS VACANT, ETC.

| | |
|--|-----|
| MEDICAL APPOINTMENTS: IMPORTANT NOTICE | 802 |
|--|-----|

EDITORIAL NOTICES

| |
|-----|
| 802 |
|-----|

importance that those women who do run the gauntlet of pregnancy, with its numerous pitfalls and vicissitudes, should receive the maximum care that a grateful nation and a skilled profession can bestow on them. Accordingly, we notice that both in England and here in Australia the question of the diminution of maternal mortality and, what is equally important, but perhaps not so widely advertised, maternal morbidity, is a very active one, not only in the medical, but also in the political sphere.

It is with the object of lessening the morbidity of childbirth that I propose to discuss this evening some of the obstacles and difficulties that I personally have encountered in practice, and the steps that I have taken to guard against similar occurrences in other pregnancies. I shall also point out some ways in which the practice of obstetrics—still the Cinderella of the medical tripos—can be improved with the help of the politician.

The goal of the obstetrician is not only the efficient delivery of a living child to the joyful parents (of the proper sex, of course, if possible), but also the ensurance that, after the confinement and puerperium are all over, the mother shall be as healthy as she was before the pregnancy took place; able again to do, without fatigue, her daily round, her common task; to take part in and enjoy her sexual functions as efficiently as before; and, moreover, to be able to suckle, feed and nurture the new little arrival in the household. This is a tall order, but it is, I believe, the aim of each and every one of us here tonight. But how often are we weighed in the balances and found wanting, for there has been some "obstacle" to the successful accomplishment of that aim, so that our 100% efficiency ideal falls, momentarily shattered.

Diagnosis of Pregnancy.

Coming now to more practical details, one of the first obstacles of obstetrics that the embryo obstetrician meets (and not only the embryo) is the question: "Is this woman really pregnant?" It is a question also of profound importance to the patient herself, and one in which the practitioner cannot as a rule afford to hedge. "A touch of pregnancy" as a diagnosis is too much for even the most credulous of the countryside to swallow. The rule of regarding every patient of puerperal age, suffering from amenorrhoea, as pregnant until proved otherwise holds good for the majority of patients, and I have found the most valuable sign of an early pregnancy to be the globular fullness in the anterior fornix, felt as soon as the examining finger enters the vagina.

When any doubt exists as to the fact of pregnancy in the early months, one could take a lesson from the war-time Prime Minister of England (Mr. Asquith), with his famous sentence: "Wait and see"; but, alas, the speed and hurry incidental to modern life demand a more direct answer, and biology has come to the rescue of the harassed but would-be truthful practitioner by furnishing him with the Aschheim-Zondek test, by which 98% of pregnancies can be accurately diagnosed.

Abortion.

The answer to the question: "Am I pregnant, doctor?" very often raises one of the most common obstetrical obstacles, for an affirmative answer, which causes one woman to sing paens of praise for the coming joy, will cause another to wail in sackcloth and ashes.

During the year 1934-1935, at the Brisbane Hospital alone there were 592 patients admitted with abortions, and among these there were nine deaths. Whichever way you look at it, it is a remarkably big deviation from the obstetrician's objective: "a healthy mother and a healthy child".

Staggering as these figures are, they fade into insignificance, however, when we read that 86,000 artificial abortions were reported from the Moscow gynaecological clinics in 1931, and that, according

to W. Spitzer, 25,000 deaths a year are caused in Germany by induced abortions.

It is one of the hardest jobs of the physician to persuade an unwilling woman to go on with her pregnancy, to point out the risks of interference, and to explain to a vast number the nature of the interference necessary to insure a termination of pregnancy; for, to many patients, the termination is thought to be one of the simplest things that a doctor can do.

The avoidance of this wholesale slaughter appears to depend on measures that are partly medical, partly educational, and partly economic—a wider knowledge of contraceptive methods, instruction of the public in these methods, and such a Utopian state in actual fact (not of its appearance only as phantasmagoric political vaporizings at election time) that there will be no fear of bringing children into a world where they cannot be reared, where they cannot find jobs, or where they cannot receive necessary comforts and even luxury. If these economic matters could be remedied by our politicians, then there would be less abortions, for the women of this generation are not one whit less brave than their forbears.

On the other hand, we, as obstetricians, are faced with the fact that there is a growing tendency in the emancipation of woman to recognize her claim to be the arbiter of her own destiny. And who are we, and who are the politicians, to compel her to go through with a pregnancy that she does not desire?

I do not know what the future of this problem is to be, but I do know that the present state of affairs, in which so many women are losing their lives as a result of septic abortions, is creditable neither to the profession, the clergy, the educational authorities nor the nation. Whose the blame I know not.

The morals of the question I do not propose to discuss. The cold fact remains that numerous women in Brisbane have lost their lives through this obstetrical obstacle. What are we to do to prevent these preventable deaths?

Vomiting of Pregnancy.

Vomiting of pregnancy, though usually amenable to treatment with alkalis, occasionally to confound our prognostications responds only to the administration of dilute hydrochloric acid. In obstinate cases the intramuscular injection of calcium gluconate (in 10% solution) has worked miraculously, the patient's *joie de vivre* being restored after the first injection. I regard these injections as a distinct advance in the treatment of toxæmias of pregnancy.

Albuminuria of Pregnancy.

Albuminuria of pregnancy, though not *per se* an obstacle, must yet be regarded most seriously, as even the faintest trace of albumin may be a cloud that heralds the approaching storm of eclampsia; and when once albuminuria has occurred in a

primipara, the worries of the *accoucheur* will not be over until after the confinement, and sometimes not even then. Some cases respond to dieting and rest, but in the majority albuminuria persists to a varying degree right up to parturition. A low blood pressure is a favourable factor in the prognosis. I have had no personal experience of calcium gluconate injections in an endeavour to combat this toxæmic obstacle, but in future albuminurias I intend to use them.

Eclampsia.

So far we have safely steered our tender patient over the roughened waters of the earlier months and arrive full of hope at the seventh month, when, often without any portent of forthcoming disaster, the storm of eclampsia bursts upon us with cataclysmic suddenness.

We are aroused on the dismal dawn of a winter's morn with the story that our patient appears to have gone off in a faint and cannot be roused. Hurriedly we hasten, to find a rigid, unconscious patient who will generally oblige us by having a convulsion while we wait. "Eclampsia", we mentally ejaculate, and forthwith get busy.

I do not propose to go into details of the treatment of eclampsia, except to say that it is long and tedious, taking up most of one's time for at least twenty-four hours, but by meticulous attention to details the results are well worth while. I usually follow the method of the Rotunda Hospital (morphine injections *et cetera*), as enunciated by Tweedy and Wrench, but am inclined to induce labour by the insertion of a stomach tube into the cervix after twenty-four hours, if Nature has not already commenced the dilatation. I mention Cæsarean section as a treatment for eclampsia, but have not used it, for most of the maternal fatalities from eclampsia that I have heard of, have occurred after this operation.

I regard the prevention of eclampsia, however, as the biggest triumph attributable to ante-natal care, and perhaps the sole justification for the establishment of ante-natal clinics; but even the periodical examination of the urine cannot always foretell the probability of eclampsia. I regard the estimation of the blood pressure as equally important, and I think that it is sound treatment to send to bed immediately any pregnant woman whose systolic blood pressure is over 150, for many of these patients have convulsions, even though there has been no albuminuria two days prior to the first fit.

Hæmorrhages of Pregnancy.

Hæmorrhages can be either minor or formidable obstacles, and the former can merge into the latter with the greatest of ease. The hæmorrhages in the earlier months make one take precautions for a threatened abortion. In both an inevitable and an incomplete abortion curettage should be performed. There is diversity of opinion as to whether operation should be performed in a septic abortion, and

also in an abortion that is apparently complete. I am inclined to the view that curettage should be adopted in both.

Apart from these, however, there are many instances in which intermittent hæmorrhages occur throughout pregnancy: painless, causeless uterine hæmorrhages. We ask: "Is it *placenta prævia*?" It may be. But in many of these cases small hæmorrhages continue right up to term without any apparent ill-effect, except for a few more grey hairs on the part of the physician, who in these circumstances is always apprehensive of a sudden deluge spelling *placenta prævia*.

I have had one case of severe accidental *ante partum* hæmorrhage, in which the patient died twelve hours after delivery. In any subsequent similar case I should perform a Cæsarean section before the blood loss became too profound.

I have had also one case of hydatidiform mole in a *primipara*, in whom I induced labour at the sixth month. The fact that the uterus was much larger than the history of pregnancy suggested made me suspicious, and I sent her into hospital, where the next day she obligingly passed some detached vesicles. In this case the recurring hæmorrhages were more severe than the usual intermittent hæmorrhages of pregnancy.

The First Stage of Labour.

The chief obstacle to be overcome during the first stage of labour is pain. Although formerly pain was regarded as the inevitable accompaniment of labour and was held to be a religious chastening for the sin of the original Eve, modern scientific thought, even more religious and Christian-like in its attitude than the most enthusiastic of the ultra-religious of previous generations, has been at work trying to alleviate the pangs of labour with safety to mother and child. To a great extent science has succeeded, in spite of a lot of antagonism from various sources, not the least being the fear of the patients themselves.

I do not think that we as a profession in Brisbane, and certainly not one-hundredth of the patients benefited, recognize what a great debt of gratitude we and they owe to one of the founders of this section, Dr. Hope Michod. By his paper on "Twilight Sleep", which he read to the Queensland Branch of the British Medical Association in Brisbane some years ago, many who formerly were too afraid to tread it have enthusiastically followed the path he blazoned, with immense commensurate benefit to their patients.

Dr. Michod's paper marked an epoch in the advance of analgesia during labour and laid the foundation stone for better obstetrics in Queensland. It has enabled a policy of watchful expectancy to be adopted in many cases that would previously have resulted either in the premature application of forceps or else in days of untold, unforgettable mental and physical suffering for hundreds of women and, let me also add, for their attendants.

To insure, however, the best results from twilight sleep, I am definitely of the opinion that the *accoucheur* should see his patients fairly frequently, say at four-hourly intervals, in order to watch the progress of events. Let me visualize a little and say that in all probability in the future the modern private maternity hospital will do as the public maternity hospital does, and will provide, in addition to "lying-in" rooms for the patients, a "lying-down" room for the doctor, who in this case will act as a temporary resident officer for his own patient. This will obviate one of the obstacles of a busy obstetrical practice, namely, the frequent night calls, often hours before the actual necessity arises. The doctor will be able to rest peacefully, knowing that he is within easy call of his own patient, and he will still be on the telephone in case he is wanted for any other emergency.

But why confine these benefits to the modern, up-to-date hospital? That brings me to the next obstetrical obstacle, the conduct of labour in private houses.

Labour in Private Houses.

All of us will agree, I think, that hospital *accouchement* offers the best chance to the patient of a successful ending to her pregnancy, but for various reasons it is impossible to confine every woman in hospital, much as we should like to do.

That being so, we must try to make the home conditions as beneficial as possible to the patient, realizing at the same time that, if the patient is to get the best results, the physician must also be mentally at rest while attending her. Too often, however, the first intimation that a patient is in labour comes from an agitated voice over the telephone: "Nurse wants you to come at once to Mrs. X." Casting all other things aside, you go at once to Mrs. X, to find her beaming blissfully with natural pleasure at seeing you, but it is obviously quite too early for you to proceed with delivery. The nurse explains that her message was: "Mrs. X has started", but, like many other messages, it has been "mutilated in transit", and you depart, wondering if you will have to hurry so much next time. Hours later you get another call to Mrs. X; conscientiously you hurry, to find that the baby has been born before your arrival; the nearest available telephone has been some distance from the house.

These conditions, under which we so often have to work, are helpful neither to our patients, ourselves nor our work, and help to add to the unjustifiable risks that a prospective mother undergoes.

I would suggest that, when a woman elects to have her baby in a private house: (i) She should provide a reasonably comfortable bed or couch for the use, if necessary, of the *accoucheur*. (ii) The Commonwealth Government, to prove its *bona fides* in its desire for the elimination of maternal mortality, should provide, when practicable, a temporary telephone service in the house for a month before and after the expected date of labour; no ground rent should be charged; the first thirty calls should be

free, but any excess of thirty might be charged for at the rate of twopence per call.

By the adoption of these suggestions the numerous little anxieties that arise in the conduct of the labour and puerperium could be quickly communicated to the physician and promptly remedied, and a certain amount of increased telephone revenue would accrue to the department. With a telephone in the house the tendency to use it would increase, a certain measure of increased useful employment would result from the installation and removal of telephones, and, finally, any monetary loss from such a service would be more than counterbalanced by fitter mothers and healthier babies and would give a lead to our politicians to demonstrate that "actions speak louder than words".

A Long First Stage of Labour.

A long first stage is often due to a posterior position; the head not coming down well to the pelvic floor and a longer degree of internal rotation being necessary, the cervix often takes a long time to dilate. Preliminary version with Buist's pads and a binder, together with quinination of the uterus for three weeks prior to labour and the adoption of twilight sleep during labour, will help to surmount this "obstacle".

The Second Stage of Labour.

The second stage is most variable in its length, in some cases being a matter of seconds only, while in others labour drags on wearingly and tiringly to its end.

The constant, insistent, beseeching of the patient for chloroform and: "Can't you do something for me, doctor?" the shrieks of pain and fear with each uterine contraction, the agitation of the relatives, their lowered brows and menacing gestures (if the confinement is taking place in the house), the repeated telephone communications from scattered members of the family upsetting the staid routine of the hospital, all place added obstacles to the physician, whose greatest danger now is that he will let his sympathy conquer his judgement and that he will apply forceps prematurely. If the patient is under medical narcosis these dangers are not so evident; but the question arises in a great many, if not all cases, and especially in *primiparae*: "How is this labour to be terminated?"

The rules that guide me to a decision are as follows:

1. Try to find out what is causing the obstacle to delivery. Often this is not possible until the head has been born, when we find that a hand has been tucked up under the chin, thus diminishing flexion and causing a larger diameter of the head to engage.

2. If pains are weak and non-bearing-down in character, give pituitrin up to 0.3 cubic centimetre (five minims), together with chloroform.

3. If pains are strong, if head is visible and no progress is being made, apply forceps.

Absence of Anæsthetist.

Absence of an anæsthetist is, I think, one of our biggest obstacles. Just as a properly administered anæsthetic is a *sine qua non* for the performance of a successful operation by the surgeon, so do I regard a properly administered anæsthetic as essential for successful midwifery. In a private hospital and even in our public maternity hospitals, proper anæsthesia is most difficult to procure, the administration of chloroform being left to a nurse. (The responsibility rests, however, on the doctor, who usually has quite enough to worry about without this added thrust.)

Any surgeon attempting to conduct an operation with the limited number of assistants afforded the obstetrician would simply court disaster; the surgeon takes a pride in his work and glories in the help he gets from his team mates. Let us be equally proud of our work and realize that instead of "making anything do", as has been the makeshift position of the obstetrician in the past, our motto for the future should be "only the best will do", and we should get the best of assistance, both in quantity and quality.

In private homes the anæsthetic administration is even more crude, the one nurse generally having to administer the chloroform, to restrain the patient in her struggles, to hold the leg in position for the doctor, and generally to comport herself to be not only "everything by turns and nothing long", but everything at once, for the duties incidental to the actual birth are manifold and various, and prompt efficiency must characterize the actions of both doctor and nurse—a herculean task for but two pairs of hands.

The Prime Minister of England, Mr. Stanley Baldwin, speaking at the dinner of the British College of Obstetricians and Gynaecologists on November 5, 1934, said that he wanted to see the day come when the best form of anæsthesia for use in childbirth would be within the reach of every woman in the kingdom. He also said that there was an immense amount of work to be done to reduce maternal mortality, and that if the Government could help in any way, it would be glad to do so. Yet Mr. Baldwin is a conservative, and England is a conservative country, not an up-to-date, advanced country like our own Queensland. I would suggest, therefore, that our own Government, either Commonwealth or State, for both are interested in maternal welfare, should show its practical help towards securing proper anæsthesia in labour by undertaking to pay a fee of one guinea to every doctor who is called upon to administer an anæsthetic in labour, providing another doctor is in attendance on the patient.

Breech Delivery.

Breech delivery is a formidable obstacle, for it means so often the death of the baby. I believe a qualified anæsthetist to be essential to the successful management of a breech case. In a frank breech case there is often delay due to extended legs. After

the cervix is fully dilated, under general anæsthesia I pass my hand into the uterus, pull down both legs and perform an episiotomy. I then let the patient come out of the anæsthetic until the pains recur and the child is born to the umbilicus. The anæsthetic is then readministered. Firm pressure on the fundus is made by an assistant (preferably the anæsthetist, for he is the one capable of pressing firmly in the direction of the pelvic axis) while the arms and head are being delivered.

I regard this proper pressure by the assistant as one of the most important manœuvres in the extraction of the breech.

Care of the Perineum.

I must confess to a feeling of deep disappointment that in *primiparae* I have been unable to feel confident in my ability so to conduct the labour that no perineal sutures would be required. I have purposely avoided forceps in order to save the perineum, only to find that at the last minute the perineum tears; and I have applied forceps in other cases, but unfortunately I find that the perineum gives only too easily. In many cases the vaginal orifice is very small to begin with, and in other patients there seems to be almost an œdema of the perineum, and it tears like wet blotting paper.

Perhaps the tearing of the perineum is the price that modern woman pays for late marriage, delayed pregnancy, and twilight sleep. The gradual dilatation of the vulva as pain succeeds pain in the second stage tends to stretch the parts and to prevent tears, but I do not think that we nowadays give the perineum the same chance to stretch. However, I consider the ideal is to get the nape of the baby's neck below the pubic symphysis before commencing the movement of extension, and to have the patient under deep anæsthesia when the head is crowned. If these ideals are aimed at, I think that the number of torn perineums will be fewer, but I shall be very interested to hear your candid experiences of trying to preserve the perineum. The perineum, once being torn, requires suturing, and it is here that I consider a reform is long overdue. The patient already has had a long innings and, with the birth of the baby, every effort should now be made to conserve and preserve her strength. The blood loss should be eliminated and stopped as much as possible. She should, in my opinion, not be subjected to further exposure and time-wasting procedures by attempting to suture the perineum there and then; it is difficult to suture properly and to get proper approximation of the parts with blood from the uterus constantly streaming over the operative field.

I consider, therefore, that the repair should be postponed till the next day, when the bleeding will have ceased, the patient will have recovered some of her strength, and conditions will be more suitable for a successful repair. An anæsthetic can then be administered.

Objections to such a proceeding are: (i) Patients do not like to have a second anæsthetic the day

after the confinement. (ii) Time of the hospital is taken up. (iii) The doctor's time is taken up. When analysed critically by what should be our main criterion in all medical work, the patient's well-being, do the above objections counterbalance the benefits? I think not.

Resuscitation.

Immediately the head is born I prod it with my fingers to note the degree of circulation; if the white colour thus produced is but slowly replaced by the purple, then I regard it as an indication to accelerate the delivery of the shoulders and body.

In *asphyxia neonatorum* I have found a hot bath, together with mouth-blowing through a handkerchief and fingers pressed in under the baby's left hypochondrium, to be most successful as a rule.

I now mention one drug that is gaining vastly in popular fancy, to wit, "Sodium amyta" for twilight sleep. I do not like using it much, and greatly prefer the morphine and hyoscine injections, supplemented perhaps by one, or at most two, capsules of "Sodium amyta", that replace one or two injections of hyoscine, if the patient is violently restless.

My chief reason for not using "Sodium amyta" in large doses is this: In no case in which I have used "Sodium amyta" have I been free from anxiety about the baby's breathing. I feel sure that two or three babies' deaths were due to its use, whereas in no case in which I used the injections alone have I had the slightest anxiety after the baby was born.

Furthermore, immediately the baby is born I insist on its being wrapped in a blanket (to mitigate heat loss), even before the cord is tied. It is an obstacle to the baby's progress to let it lie in the wet bed until the ligation of the cord.

Post Partum Haemorrhage.

Immediately after the baby is born I turn the patient onto her back and 0.5 cubic centimetre of pituitrin is injected intramuscularly. After waiting ten minutes I scrub up and examine the patient *per vaginam*. If I can feel the placenta I proceed to deliver it by a combination of suprapubic pressure with the left hand and manipulation of the placenta in the vagina with my right.

This early delivery of the placenta, or rather early examination to see whether the placenta is ready, is, I feel sure, a very real prophylactic against *post partum* haemorrhage; by the time the placenta has been delivered the pituitrin has begun to take effect, and a nice uterine contraction is obtained.

Since adopting the above manoeuvre about two years ago, I feel that I have saved pints of blood for my patients, for the presence of the placenta in the cervix in labour, as well as in abortion, prevents closure of the vessels at the placental site; with the removal of the placenta the haemorrhage generally ceases in both conditions.

Cracked Nipples.

Although I have followed De Lee by treating the nipples with lanoline during the last month of

pregnancy, I have to confess general disappointment with the results, as many mothers suffer from cracked nipples.

Mammary Abscess.

Mammary abscess is a frequent obstacle during the puerperium; it is, I think, generally due to an engorged breast not being sufficiently emptied at the feedings, the result being a pool of stagnant milk, which forms a nidus for infective bacteria.

Puerperal Sepsis.

Very potent factors in the prophylaxis of puerperal sepsis, which is perhaps the most fatal obstacle to obstetrics, are: (i) twilight sleep with consequent (ii) minimum of trauma, (iii) conservation of blood to keep up resistance to infection, (iv) confinement under suitable conditions.

The Morning Nurse.

The conditions under which some patients survive labour might well illustrate the phrase "survival of the fittest", for the institution known as the morning nurse must surely be a relic of mediæval midwifery and is no mean obstacle to obstetrical progress. That a nurse within an hour of a patient's confinement will leave her and hurry off to some other case, with the ever-prominent danger of sudden *post partum* haemorrhage, is simply an invitation for the grim messenger to enter, and even in a non-serious case is, I am sure, the cause of much post-puerperal morbidity.

Well do I remember the first time I met this obstetrical camp follower.

My patient, a *primipara* with a cardiac murmur, had been two and a half days in labour, which terminated with the application of forceps. Imagine my astonishment on finding that the nurse was packed up and ready to leave as soon as I was. Youthfully innocent as I was, this was the biggest insult my obstetrical soul had then encountered, and the scar still remains.

Surely in these quasi-enlightened days it is not too much for the health authorities to insist that a morning nurse must wait with her patient for at least twelve hours after delivery.

Ante-Natal Clinics.

It will seem strange to most of you, I feel sure, to hear me class an ante-natal clinic as an obstetrical obstacle; but it is the principle of the system under which the ante-natal clinics are run, rather than any impugnation of the good work effected thereat, that I regard as an obstacle in the advance of obstetrics.

I regard the principle that "the routine care of the pregnant woman should be in the hands of those who will attend her during labour" to be eminently sound, but such conditions do not obtain at the ante-natal clinics in Brisbane.

Most private practitioners, and certainly all obstetricians, do nowadays pay great attention to ante-natal care, and, by so doing, undoubtedly anticipate, and are able to prevent, many cases of

eclampsia; they are also prepared for many emergencies during labour. But we must not place too much faith in ante-natal work, for most of the trouble in obstetrics arises during, or as a result of, the intra-natal period, when the successful obstetrician must be always ready to combat any emergency; and, be it noted, most of these obstetrical emergencies arise suddenly and demand prompt and correct treatment.

At the Lady Bowen Hospital the ante-natal care is left to the junior honorary officers, who do not follow up the patient when labour starts; as a result they lose a great deal of the practical value of their examinations.

Let me quote what George Buchan said in *The British Medical Journal* of August 4, 1934, in a paper: "Are We Satisfied with the Results of Ante-Natal Care?" He writes:

It is impossible for an ante-natal medical officer materially to enhance his experience, unless he is in a position to check his diagnosis and prognosis by the happenings at the confinement itself. A paper report by another practitioner is insufficient for this purpose and is an unsatisfactory alternative to attendance at the confinement.

These remarks apply with even greater force to the extra-hospital ante-natal clinics; and I am of opinion that greater benefit to the patient, as well as to the doctor, results when intra-natal care is conducted by the person who has charge of the ante-natal care.

Otherwise a position will arise similar to that in England, as Sir John S. Fairbain has pointed out in *The British Medical Journal* of August 4, 1934:

Ante-natal supervision is so integrated with the rest of midwifery practice that it cannot be separated off without the efficiency of both the part and the whole suffering greatly. Its segregation in the public ante-natal clinics has been open to obvious criticism on this score. The result has been that the country has never received a proper return for the money expended on these clinics.

I would therefore suggest that it is eminently more desirable that the ante-natal clinics should not be a distinct entity from the maternity hospital, and that all the honorary officers at the obstetrical hospital should take their share of the ante-natal work.

Maternity Allowances.

"What?" I hear you exclaim. "Maternity allowances an obstacle?" "How so?" "Absurd!" Well, this might be termed a negative obstacle, because, if its application were altered a little, it would tend to become a positive incentive towards better obstetrics. I shall not detain you long in academic argument, but, briefly, the maternity allowance, or, to speak more colloquially, the "baby bonus", was given to allow the mothers to have better care during labour. Believing, as I do, that the maximum benefits to the mother and child accrue when both doctor and nurse are in attendance, I would recommend that the bonus be paid only when a nurse and a doctor have been in attendance on the

patient, except when she resides more than ten miles from a public maternity hospital.

If this were adopted I do not foresee any hardships to patients, who, if they were unable to afford private doctor and nurse, would go to the public maternity hospital, where they would be attended by both a doctor and a nurse. It would, as I have tried to point out in this paper, eliminate much of the shoddy midwifery and much of the "making things do" out of makeshifts, that form such an obstacle to efficient obstetrics today.

Conclusion.

In conclusion I must thank you for the patient hearing you have accorded me. You will realize that this paper has not been exactly a laudatory exaltation of successful results on my part, nor must you regard it as the "whinings of a whinger"; it has been a summary of what I consider to be obstacles in the path of more roseate results in our obstetrical art, obstacles that are certainly not all medical.

I have been critical of many phases of that art, and of the conditions under which we are reluctantly compelled to work; but you will, I am sure, realize and agree that my criticism has been quite impersonal, and, let me plead, it has not been wholly destructive.

These difficulties are not intended by any means to be a complete list of obstetrical obstacles, but they, at various stages since I graduated, have been very real personal obstacles to me. Many of them have remained obstacles in spite of the excellent teaching I received at the hands of Dr. Felix Meyer, of Melbourne, whose dramatic obstetrical lectures I appreciated deeply then, as I do now (and to whom I always feel I owe a deep debt), and in spite of the readings of various text-books. But obstacles are made to be surmounted; and if I receive any help tonight from you, my colleagues, who may have been able to surmount some of my obstacles, and if in return I may have given some hints to you in overcoming some of your obstacles, I shall feel that I have not written this paper in vain.

Summary.

1. I have endeavoured to put before you some of the difficulties that beset us in our obstetrical endeavours.
2. The alleviation of some of the difficulties lies in our own hands.
3. The Commonwealth Government can help to improve matters: (a) by facilitating telephonic services to parturients, (b) by altering the conditions of the maternity allowance, (c) by payment of an anaesthetic fee to doctors in maternity cases.
4. The State Government can help: (a) by linking up ante-natal clinics with public maternity hospitals, (b) by better regulation of morning nurses, (c) by education of the general public.

AN EVOLUTIONARY FACTOR IN PARTURITION:
THE LAW OF THE SPLIT PELVIS.

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PARTURITION, on account of its bearing on human maternal mortality and morbidity, has been investigated from many different angles; but, so far as I can ascertain, there is an evolutionary aspect which hitherto has not been considered and which forms the subject of this contribution.

The intimate relationship existing between the engaging circumference of the human foetal head and that of the maternal pelvic brim is a matter of great importance, not only in obstetrics, but also in comparative osteology, because of an evolutionary crisis that it indicates in the parturition of man. This relationship is so close that it is at once evident that there is a condition of more or less stable equilibrium between the two components, for even in normal parturition slight discrepancies occur very frequently, which are overcome by moulding of the foetal head, with consequent overlapping of the bones of the cranial vault. In addition, a disturbing factor exists, for it appears certain that the slow evolutionary process which increased cranial capacity in the past is still operating, and Keith (quoted by Kathleen Vaughan⁽¹⁾) considers that "the heads of the race were getting larger amongst civilized peoples, but the pelvis did not seem to be keeping pace with them". Again, Heffernan,⁽²⁾ in commenting upon obstetric practice in Victoria, referred to the tendency towards definite disproportion between the foetal head and the pelvic brim in the last few weeks of pregnancy, in spite of the large number of normal or even roomy pelvis. It would appear, therefore, that man is verging upon a critical period in his history; and if he is to survive, the pelvis must adapt itself to the enlarging head.

Comparative osteology indicates that in the history of the pelvis difficulties with parturition have occurred before, and this investigation is an attempt to inquire into those crises, to ascertain how Nature responded, and to what extent repetition is likely to occur in regard to the human problem.

The Split Pelvis in Reptiles.

Though a pelvis exists in fish, the typical structure, consisting of ilium, ischium and pubis, articulating with the vertebral column on each side, is not found outside the Tetrapoda, or four-legged, air-breathing vertebrates.

The most ancient and primitive of the Tetrapoda are the Amphibia, but from the available evidence no osteological difficulties to parturition appear to have occurred in any member of this great group; and it was not until the more highly organized reptiles had arisen and reached their zenith by producing the dinosaurs that the first indication of a parturitional crisis is to be encountered. The

group concerned is the Ornithischia (or predentate dinosaurs), in which, superficially at least, the pelvis bears a striking resemblance to that of the birds. In these dinosaurs the pelvis was open or split, as there was no pelvic symphysis; but which parts of the pubic region are homologous in the avian pelvis is still in doubt, on account of the presence of pre-pubic and post-pubic processes in the Ornithischia. Another difficulty arises from the development of birds, for in this group the pubis at first is normal in position, but later turns posteriorly and occupies the same position as the post-pubic process of the Ornithischia. These points, however, are only of minor importance in this connexion, for the feature of interest is the open pelvis, which has appeared for the first time. The evolution of this type of pelvis has been of considerable interest to palaeontologists, for, while a number consider it to be related to the functions of the tail, others favour a procreational cause, and this is the view taken by no less an authority than Williston,⁽³⁾ who pointed out that this form of pelvis allowed of the passage of larger eggs.

It would thus appear that the Ornithischia were the first group to undergo a radical change in the conformation of the pelvis in response to the requirements of parturition.

The split or open pelvis does not occur in any other group of the reptiles.

The Split Pelvis in Birds.

Birds form a well defined group, which appear to have had a reptilian origin from diapsidan ancestors, and in this way are remotely related to the ornithischian dinosaurs. The pelvis is split or open and constitutes one of the most characteristic features of the class. The ostrich (*Struthio*) is exceptional in the possession of a pubic symphysis, but as this occurs at the posterior extremity of the pelvis, near the caudal vertebrae, the fundamentally open nature of the pelvis is unaltered. A somewhat similar condition is found in the South American rhea, in which an ischiadic symphysis occurs in an analogous position to the pubic symphysis of the ostrich.

It is definitely established that this form of pelvis is associated with the laying of relatively large eggs. By the separation of the ventral symphysis and the gaping of the pelvis it follows that a mechanical advantage in favour of the products of conception has been produced. Obviously it is evident in the history of avian parturition that there was a stage in the egg-pelvis complex resembling the one at present existing between the human pelvic brim and the foetal head; furthermore, as the egg increased in size, the pelvis adapted itself to the demands of the change by a disruption of the ventral symphysis and the production of the open pelvis.

Doubtless the ovoid shape of the avian egg was evolved in an attempt to reduce the cross-section passing through a closed pelvis, for it will be remembered that the shape of the primitive vertebrate egg is spherical.

Parturition in Mammals.

Difficult parturition due to disproportion between the foetus and the pelvis is not an outstanding feature of the Mammalia, and it is not until man is reached that the phenomenon becomes one of prime importance. Disproportion, however, does occur sporadically, and it is overcome by the following adaptations: (i) relaxation of the pelvic ligaments, (ii) temporary separation of the ventral symphysis, (iii) circular pelvic brim, (iv) moulding of the foetal head, (v) split pelvis.



FIGURE I.

Avian type of open pelvis (ventral view). il. = ilium; is. = ischium; o.s. = showing absence of symphysis; p. = pubis; s. = sacrum in bird.

Relaxation of the Pelvic Ligaments.

Relaxation of the pelvic ligaments occurs in the Carnivora (seal) and Ungulata (cow). In the cow the sacro-iliac joints are those chiefly affected. This adaptation appears to be one of the simplest responses to disproportion, and from its nature is limited in scope, as the pelvic brim is not disrupted.

Temporary Separation of the Ventral Symphysis.

Temporary separation of the pelvic symphysis occurs in rodents, such as the guinea-pig and rabbit, and may be regarded as an advance upon the previous condition. Le Gallois, in 1812, described parturition in the guinea-pig and showed how the head of the foetus, with an average diameter of twenty millimetres, was able to pass through the pelvic outlet, averaging eleven millimetres in

diameter, by the gaping of the ventral symphysis. Several weeks before parturition the ligaments become thickened and flexible and allow the symphysis to gape, but a few days after delivery has occurred the symphysis becomes normal again, with the disappearance of the gape.⁽⁴⁾

The Circular Pelvic Brim.

In man the pelvic brim index is derived from the internal conjugate, measured from the mid-point of the sacral promontory to the posterior border of the pubic symphysis, and the transverse diameter of the brim, which is taken as the maximum transverse measurement between the ilio-pectineal lines.

$$\text{Pelvic brim index} = \frac{\text{Internal conjugate} \times 100}{\text{Transverse diameter}}$$

From this follows Turner's well known classification of the human pelvis:

- (a) Platypellic—below 90, for example white race, 80.
- (b) Mesatipellic—from 90 to 95, for example negro, 93.
- (c) Dolichopellic—above 95, for example aboriginal, 97

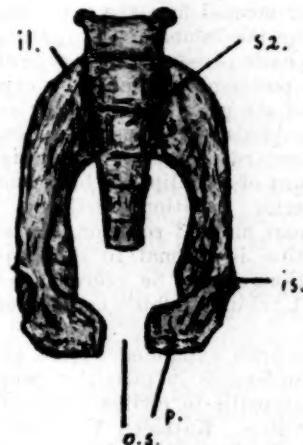


FIGURE II.

Mammalian type of open pelvis. il. = ilium; is. = ischium; o.s. = showing absence of symphysis; p. = pubis; s. 2 = second sacral vertebra in mammal.

The pelvic brim of all mammals below man is typically elliptical in contour, that is, the transverse diameter of the brim is shorter than the internal conjugate, and Thoms⁽⁵⁾ has extended the term "dolichopellic" to include this type of pelvis. This condition is in marked contrast to man, in whom the outline approaches the circle. In primitive races there is a greater degree of approximation to the circle than in civilized man, with his platypellic pelvis, in which the internal conjugate is less than the transverse diameter; in the dolichopellic pelvis of the aboriginal and Andamanese these dimensions are approximately equal.

The change from the lower mammalian condition of the brim to the human is strongly suggestive of a response to the requirements of the foetal head,

as it is obvious that a circular pelvic brim will permit of the passage of a larger head than an elongated one of the same circumference.

Keith⁽⁴⁾ has shown that in the anthropoids the pelvis is roomy and a pelvic bar does not interfere with parturition. In the gorilla the transverse width of the true pelvis is of human dimensions, with the true conjugate often double that of man; in the chimpanzee the corresponding dimensions are less than the human and half as much again respectively. The typical mammalian presentation of the foetus is by the head, and in parturition the chin passes over the pubic arch; in man, however, there has been rotation in the long axis of the foetus, so that the occiput normally faces the pubes instead of the chin. In other words, the typical mammalian presentation is cephalic, as in man, but the position is occipito-posterior, whereas in man it is occipito-anterior.

An atavistic condition, however, occurs in man in regard to the high assimilation pelvis, which possesses an elliptical brim and which is characterized by including six elements in the sacrum instead of the normal five, the extra element being contributed by the lumbar spine. In this form of pelvis the cephalic presentation is typically occipito-posterior in position, as would be expected from the contour of the pelvic brim and by analogy with the lower animals. It has been suggested by Thoms⁽⁵⁾ in regard to the high assimilation pelvis, that on account of its elliptical brim and associated occipito-posterior position, delivery should be effected without manual rotation. In other words, such a position is normal to this type of pelvis and parturition should be allowed to proceed in the ancestral "chin-to-pubis" manner of the lower mammal.

The pelvic brim expanded to the greatest area for the circumference in primitive peoples, but by becoming platypellic in civilized races it has made a retrograde step. Kathleen Vaughan⁽¹⁾ has done much to emphasize this point and stresses the advantage of a circular brim in her dictum: "Maternity is a natural function and is easy and safe when the pelvis of the race fits the head of the race." In the case of a foetal head adapted to its corresponding circular brim, it follows that if the brim becomes platypellic, a greater stress is thrown upon the pelvis during parturition by such a change, and particularly involves the pubic symphysis, which in extreme cases may undergo spontaneous rupture, a phenomenon which does not affect other parts of the pelvis.

Moulding of the Fetal Head.

Moulding of the foetal head is well exemplified in human obstetrics and involves the bones of the cranial vault, namely, frontal, parietals and exoccipital. The volume of the foetal skull is reduced by the overlapping of these bones, and in minor degrees of disproportion is a valuable aid to parturition. This overlapping of the bones of the cranial vault is probably the most important foetal

adaptation to overcome disproportion in Mammalia, and resulted from similar forces which evolved the ovoid egg of the birds with the same objective: the reduction in size of the engaging cross-section.

The Split Pelvis.

The split pelvis occurs in the Mammalia, but only sporadically. It is found in certain of the Insectivora, such as *Talpa*, *Centetes*, *Sorex*, *Hemicentetes et cetera*, as well as in a number of bats, such as *Vesperilio*. Of these, the true Tenrec (*Centetes caudatus*) is of considerable interest on account of the large number of young it produces at a birth, up to twenty-one having been reported.

The pelvis of *Hemicentetes* is an excellent example of the mammalian split pelvis. The ilia are long bones, which articulate with a pair of sacral vertebrae, while the pubes are comparatively short and widely separated from one another in front. The brim is typically elliptical in shape, but incomplete ventrally through the absence of the symphysis. The form of pelvis may be regarded as a permanent condition of what occurs temporarily in the pelvis of the guinea-pig and rabbit during parturition.

On comparing the pelvis of *Hemicentetes* with that of a bird, several important points of difference immediately become apparent. In the first instance the sacrum of the bird includes the whole of the lumbar spine and consists of from nine to twenty vertebrae fused together to form a long composite bone, the synsacrum; on the other hand, in *Hemicentetes* there are only two bones in the sacrum, and they are quite distinct. Again, in the bird the ilium is a greatly developed bone, particularly in the antero-posterior axis, which explains the need for a long synsacrum for its articulation, whereas in *Hemicentetes* the ilia are only of normal proportions. Doubtless these differences indicate pelvis at different stages in evolution; that of the bird having evolved much further than that of *Hemicentetes*.

The Law of the Split Pelvis.

Through the work of Broom⁽⁷⁾ and others, the ancestry of the Mammalia has been traced back to the Mesozoic mammal-like reptiles of South Africa, of which the cynodonts and ictidosaurs appear to be the most intimately concerned in the origin of the group. The resemblance of the pelvis of a typical mammal to that of a higher cynodont is most striking; in each the pelvis is closed, with a characteristic development of the ilium and a corresponding reduction in the pubis; an obturator foramen is present and the symphysis is ischio-pubic.

An examination of the ventral symphysis of the pelvis from the marsupials to man reveals a gradual simplification in structure, together with a movement of incomplete separation of the two pelvic components, which begins posteriorly and terminates at the pubic symphysis in the human pelvis.

As in monotremes, the ventral symphysis of the marsupial pelvis is ischio-pubic, and doubtless is an inheritance from synapsidan ancestors. The

ischiadie angle is wide in the marsupial and is occupied by a triangular plate of bone, which Parsons⁽⁸⁾ has homologized with the reptilian hypischium. He considers that the hypischium is represented in the higher mammals, but instead of remaining a separate bone, as in marsupials, it has become epiphyseal in nature.

In the more primitive mammalian forms, such as the rabbit, this epiphysis closely resembles the marsupial hypischium both in shape and position; but as the mammalian series is ascended the hypischial epiphysis divides incompletely posteriorly, and Parsons considers that this device is an aid to parturition in the Ungulata, in which this type of epiphysis occurs.

In the human pelvis this splitting has gone still further, reducing the ventral symphysis to the pubes, and at the same time it has caused the hypischial epiphysis to be spread out along the ischial margin to the tuberosity as a thin plate.

It is clear from the evidence already submitted that the mammalian pelvis is in a state of flux and not static like the stereotyped pelvis of birds; furthermore, it would appear that parturition is a prime factor in this matter. On examining the evolutionary forces operating, there are to be seen two series of pelvic change, depending upon the nature of the pelvis concerned, whether it is comparatively rigid or plastic at the articulations.

In the case of the plastic pelvis the first stage is to be seen in the cow and seal, with the relaxation of the pelvic ligaments; the next is the temporary disruption of the ventral symphysis occurring in the guinea-pig and rabbit; while the third and last stage is the split pelvis itself, as found in *Hemicentetes*.

In regard to the rigid pelvis, on account of the minor rôle of the ligaments, it follows that change must affect either the bony pelvis or the foetus, or both. One of the best examples of this form of pelvis is to be seen in man himself, in whom conspicuous changes are to be seen in both the foetus and the pelvis. In the foetus, moulding of the cranial vault is a common, though not an invariable, phenomenon, and there has been a radical change in the presentation of the head. In the lower mammals the head is furnished with a snout and the presenting part is the wedge-shaped facial region, with the snout at the apex; in man the facial skeleton is greatly reduced, while the cranium is characteristically enlarged, and this alteration in skull architecture is the cause of the radical change from the typical mammalian snout presentation to the human occipital, as the presenting wedge shifts from the facial region to the cranium, with the apex at the occiput. At the same time the nature and position of the atlanto-occipital joint plays an extremely important part in flexing the head and bringing the occiput still lower during parturition.

In regard to the pelvis itself, the brim has changed from the elliptical (or dolichopellic of Thoms) to

the platypellic in civilized races, and in doing this has increased the area enclosed by the pelvic brim, thus permitting of the passage of a large head. The maximum efficiency of the pelvic brim in the closed pelvis is reached when it becomes circular, as in the dolichopellic pelvis of the Australian aboriginal and Andamanese; but a retrograde step has been taken in regard to the platypellic pelvis, with its pelvic brim index of below 90, which operates to the disadvantage of the civilized races.

As the brim has reached its maximum, the site for any further change appears to reside in the pubic symphysis. If the evolutionary dynamics, suggested by the enlarging head and the simplification of the ventral symphysis, continue to operate, then the next step in the evolution of the pelvis will be a further reduction in the pubic symphysis, until the contact will finally cease to exist and a split pelvis will result.

Already abortive attempts at the establishment of a split pelvis appear in man from time to time; unfortunately, however, in a great number of cases the innovation is accompanied by such grave abnormalities that survival nearly always requires surgical aid. Pregnancy has occurred in some of the repaired cases, and it has been recorded that parturition has proceeded both with safety and ease.

On comparing the evolutionary trend in the two classes of pelvis, both rigid and plastic, it will be seen that the goal in each instance is the same, namely, the split pelvis, and the methods of approach are at first divergent, then convergent.

It is obvious that two independent lines of evolution have led to the split pelvis in the ornithischian dinosaurs and the birds, but in the case of the mammals evolution has not proceeded so far; nevertheless it is hoped that sufficient evidence has been advanced to indicate that a similar line is evolving in this group. The mammalian line may eventually prove to be multiple, for the split pelvis has already appeared in the Insectivora and Cheiroptera, temporarily during parturition in the Rodentea, and it appears to be rising in the Primates through man.

This repetition of an innovation in widely separated groups is quite a common device of Nature and is an important principle in convergence and orthogenesis or direction in evolution along definite lines. Doubtless when this repetition occurs there is a common stimulus producing a similar response. I consider that in the three orthogenetic radiations of the split pelvis the fundamental evolutionary stimulus is the same in each case, namely, that when disproportion occurs between the products of conception and the pelvic brim there is separation of the bones at the ventral symphysis in those forms which survive. It is suggested, on account of the association with the characteristic type of pelvis, that this principle be called the law of the split pelvis.

In conclusion, as the human pelvis is undergoing changes in accordance with the law of the split pelvis, it follows in evaluating parturition and its

dangers that there are factors of an evolutionary nature which at present are beyond the scope of human control.

Acknowledgement.

I should like to express my indebtedness to Dr. C. A. Thelander for kindly criticism and advice in the preparation of this paper.

Summary.

1. The split pelvis occurs in the predestant dinosaurs, birds and sporadically in certain orders of the Mammalia.

2. The split pelvis has arisen in response to the demands of parturition.

3. It is contended that the split pelvis will arise in man.

4. The underlying evolutionary principle is the law of the split pelvis, which states:

5. When disproportion occurs between the products of conception and the pelvic brim, separation of the ventral symphysis occurs in those types which survive.

6. In evaluating parturition allowance must be made for these evolutionary factors, which at present are independent of human control.

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"O" AGGLUTININS FOR BACILLUS PROTEUS XX IN ENDEMIC TYPHUS OF NORTH QUEENSLAND.

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IN recent papers on the endemic typhus of the eastern coastal areas of North Queensland by Langan and Mathew⁽¹⁾ and Unwin,⁽²⁾ positive agglutination reactions with the Kingsbury strain of *Bacillus proteus* X were quoted in confirmation of the diagnosis. In the earlier tests recorded in these papers only living suspensions of *Bacillus proteus* X19 and *Bacillus proteus* X Kingsbury were used; later check tests were made with heated suspensions. It has since been possible to check the tests further with suspensions recommended by Felix,⁽³⁾ and to demonstrate, as described in the following brief notes, that the agglutinations in these and subsequent cases are of the "O" type.

Suspensions Used in the Tests.

Killed suspensions, alcoholized, preserved in formalin of *Bacillus proteus* X19O, *Bacillus proteus* XKO and *Bacillus proteus* X₂O were obtained from the Standards Laboratory (Medical Research Council), Department of Pathology, University of Oxford. In addition, living and alcoholized suspensions of cultures obtained from the following sources were prepared and used in a series of comparative tests:

| | | |
|------------|---|---|
| 1 OX19 | } | From the Institute of Medical Research, Kuala Lumpur, Federated Malay States, by courtesy of the Director, Dr. A. Neave Kingsbury. |
| 2 OXK | | |
| 3 OX19 | | |
| 4 HX19 | | |
| 5 OX2 | | |
| 6 HX2 | } | National Collection of Type Cultures, through the Director, Commonwealth Serum Laboratories, Melbourne. |
| 7 OXK | | |
| 8 HXK | | |
| 9 OXL | | |
| 10 HXL | | |
| 11 OX19 | } | Type cultures from the Lister Institute, London, through the Director, School of Public Health and Tropical Medicine, University of Sydney. |
| 12 OXK | | |
| 13 HXX | | |
| 14 X19 (O) | } | From the Standards Laboratory (Medical Research Council), School of Pathology, University of Oxford. |
| 15 XK | | |

Preparation of Suspensions and Methods of Testing.

The alcoholized suspensions were prepared according to the method of Bien, as described by Gardner.⁽⁴⁾ The living suspensions were prepared in normal saline solution from twenty-four hour cultures on dry agar slopes, after plating and selection of "O" and "H" type colonies. The serum dilutions and controls for the tests were prepared according to the directions which accompanied the suspensions supplied by the Oxford Standards Laboratory. When the tests were made with alcoholized suspensions the suspensions were kept in the water bath at 52° C. for twenty-four hours, and the final reading was then made. When the tests were made with living suspensions, the suspensions were kept in the water bath at 37° C. for two hours, and a reading was taken after a further twenty hours at room temperature. The titres were recorded in accordance with the directions for reading standard agglutination.

Results of Agglutination Tests.

In Table I are shown results of agglutinations of alcoholized suspensions by serums from ten different cases of fever presenting clinical pictures corresponding to those described by Langan and Mathew⁽¹⁾ and Unwin.⁽²⁾ In all the tests in which agglutination occurred the agglutination was of the "O" type, fine granules forming slowly and settling slowly into a small, firm deposit, leaving a clear supernatant fluid. The first three columns indicate the results with the suspensions prepared by the Oxford Standards Laboratory; the remaining suspensions are numbered according to the numbers given to the cultures in the text. "Original X19" is the serum from the first case in a series of thirty-three cases of fever giving a positive reaction to the Weil-Felix test, and is the only one which has given a positive reaction with *Bacillus proteus* X19, the remainder having been positive with *Bacillus proteus* XX only.

TABLE I.
Alcoholized Suspensions.

| Serum. | Oxford. | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|--------------|---------|--------|------------------|---|--------|---|---|---|---|--------|--------|-------------|----|----|--------|--------|----|--------|
| | X190 | XKO | X ₄ 0 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | |
| 1 | — | 250 | — | — | 250 | — | — | — | — | 125 | 250 | — | — | — | 250 | 250 | — | 250 |
| 2 | — | 1,000 | — | — | 1,000 | — | — | — | — | 1,000 | 1,000 | — | — | — | 1,000 | 500 | — | 1,000 |
| 3 | — | 10,000 | — | — | 10,000 | — | — | — | — | 10,000 | 10,000 | — | — | — | 5,000 | 5,000 | — | 10,000 |
| 4 | — | 2,500 | — | — | 2,500 | — | — | — | — | 2,500 | 2,500 | — | — | — | 2,500 | 2,500 | — | 2,500 |
| 5 | — | 125 | — | — | 125 | — | — | — | — | 125 | 250 | — | — | — | 125 | 125 | — | 125 |
| 6 | — | 5,000 | — | — | 5,000 | — | — | — | — | 5,000 | 5,000 | — | — | — | 2,500 | 5,000 | — | 5,000 |
| 7 | — | 500 | — | — | 250 | — | — | — | — | 500 | 500 | — | — | — | 500 | 500 | — | 500 |
| 8 | — | 1,000 | — | — | 1,000 | — | — | — | — | 500 | 1,000 | — | — | — | 1,000 | 500 | — | 1,000 |
| 9 | — | 250 | — | — | 250 | — | — | — | — | 250 | 250 | — | — | — | 250 | 250 | — | 250 |
| 10 | — | 10,000 | — | — | 10,000 | — | — | — | — | 10,000 | 10,000 | — | — | — | 10,000 | 10,000 | — | 10,000 |
| Original X19 | 500 | — | 50 | — | — | — | — | — | — | — | — | Not tested. | — | — | — | — | — | — |

In this table — indicates no agglutination; 1,000 indicates titre 1/1,000.

TABLE II.
Living Suspensions.

| Serum. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | |
|--------|---|--------|---|-------|---|-------|---|--------|--------|----|-------|----|--------|--------|----|--------|
| 1 | — | 500 | — | — | — | — | — | 250 | 500 | — | — | — | 500 | 250 | — | 250 |
| 2 | — | 1,000 | — | — | — | — | — | 500 | 1,000 | — | — | — | 1,000 | 500 | — | 1,000 |
| 3 | — | 10,000 | — | — | — | — | — | 10,000 | 10,000 | — | — | — | 10,000 | 10,000 | — | 10,000 |
| 4 | — | 2,500 | — | — | — | — | — | 1,000 | 2,500 | — | — | — | 2,500 | 1,000 | — | 2,500 |
| 5 | — | 125 | — | — | — | — | — | 125 | 125 | — | — | — | 125 | 125 | — | 125 |
| 6 | — | 2,500 | — | — | — | — | — | 2,500 | 2,500 | — | — | — | 2,500 | 2,500 | — | 2,500 |
| 7 | — | 250 | — | — | — | — | — | 250 | 500 | — | — | — | 500 | 250 | — | 500 |
| 8 | — | 1,000 | — | — | — | — | — | 1,000 | 1,000 | — | — | — | 1,000 | 500 | — | 1,000 |
| 9 | — | 250 | — | — | — | — | — | 250 | 250 | — | — | — | 250 | 250 | — | 250 |
| 10 | — | 5,000 | — | — | — | — | — | 5,000 | 10,000 | — | — | — | 10,000 | 5,000 | — | 10,000 |
| Rabbit | — | 1,000 | — | 1,000 | — | 1,000 | — | 1,000 | 1,000 | — | 1,000 | — | 1,000 | 1,000 | — | 1,000 |

In this table — indicates no agglutination; 1,000 indicates titre 1/1,000.

In Table II are shown the results given by the same serums with living suspensions similarly numbered. The agglutinations were of the "O" type, with the exception of those obtained with the rabbit serum, which were of the "H" or floccular type. The rabbit had been immunized with the HXX culture numbered Number 13 in the text. It will be noted that with the suspensions prepared by the Standards Laboratory (Medical Research Council), University of Oxford, there is, with the ten numbered serums, "O" agglutination to high titres with the suspensions of *Bacillus proteus* XKO only.

Summary.

"O" agglutinins for the Kingsbury strain of *Bacillus proteus* X are shown to be present in high titre in cases of one of the classes of endemic typhus in the eastern coastal area of North Queensland.

It is also shown that both "O" and "H" agglutinins for the X19, X2 and XL strains of *Bacillus proteus* are not present in significant amounts.

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SURGERY AT SEA IN THE EIGHTIES.

By R. SCOT SKIRVING,
Sydney.

EVEN to the last years of their employment, sailing' ships which carried passengers carried also a surgeon. If the passengers were of a sufficiently remunerative type, the advertisements of such ships "being on the berth" informed the public "that the splendid A1 ship" *et cetera* "carried a stewardess, a cow and a doctor". I do not infer that that was the actual order of precedence, but so it was sometimes printed. But the large majority of sailing ships, like the tramps of the present day, took only a very few or no passengers at all, and neither did they have a surgeon on their articles; of such was the vessel of this little story. She was a fine, wholesome, iron, full-rigged ship of about 1,200 tons—not exactly a flier, I think, for I do not find her among the regular wool fleet till 1888, when she took 114 days to London, the longest passage of that year. I suppose her crew mustered about thirty all told, and, in addition, there were a few passengers, all men, one of whom was the hero of this small tale of the sea. She sailed from Sydney, on this voyage in the early eighties, possibly to catch the London wool sales.

If the ship herself was neither a *Tweed* nor a *Cutty Sark*, her master was certainly not a Stuart

or a Woodgett—he was just a careful, competent, canny, obstinate old Scotchman, about whom many quaint tales were told regarding his leisurely ways of navigation.

He was true to his type on this passage, for many days, too many indeed, had elapsed since leaving Sydney Heads, and the ship was still a good deal short of the pitch of the Horn. However, all was well on board, and no doubt the old skipper was fairly satisfied with the distance run. Not so his mates, who were often hinting delicately that "she could stand that main to'gallant sail *et cetera* with benefit", and so forth.

But such hints fell on deaf ears, and the old man and his ship just "gaed their ain gait".

One morning the strong westerly hardened and the sea rose, but in these parallels the westing made it a fair wind for the homeward-bounders, and the old ship romped along in great style, though, no doubt, she might then have carried more sail. Later on it blew up into a gale and she was shortened down.

Seamen have often differed at times as to the best practice in running before a big sea, whether to carry sufficient sail, as some of them contended, to keep ahead of the after-coming waves, or to reduce sail. In this instance one can guess that the mates would probably be in favour of giving her more sail, for they regarded the seas chasing the ship as menacing and dangerous, while the captain reckoned they were doing all right and that he would let well alone.

However, the second mate, whose watch it now was, ventured to tell the old man "that it might perhaps be as well to give her a wee bit more sail". He was rounded on, and his commander, no doubt in his best Doric, rebuked him for "putting in his oar where there was no rowlock"; and so that was that. Anyway, the younger man must have felt a sour satisfaction that his view was correct, for half an hour later the ship was pooped by a big sea. The helmsman was a stout seaman, who knew his job, and stuck to the wheel. He was not washed away; he kept his head, and also that of the ship dead before the wind and sea.

She did not broach to, no great damage was done, and the flooded main deck soon cleared itself. But one unfortunate passenger was not so lucky. The crest of the sea picked him up where he stood near the wheel-box and carried him forward some feet above the deck and flung him with violence against the mizzen-mast and there he was caught.

The spanker, of course, was in, but with his efforts to save himself his arm got somehow jammed, either in the spanker gear or, as I seem to remember, actually between the mast itself and the iron jack-stay fixed abaft it, to which was seized the bolt rope of the spanker.

Anyway, there he hung, fixed and unable to help himself, swinging with all the weight of his body to each movement of the ship, thereby fracturing his humerus and tearing and bruising all the soft parts,

nerves and blood vessels of his incarcerated arm. Of course, he was soon released, not without difficulty, but it was certain that much damage had been done. This kind of accident cannot be as uncommon as one might suppose, for I myself remember, perhaps not very accurately, two other instances, much the same, occurring in the bush. In one, a man riding by a tree saw a parrot fly out of a hole within reach. He pulled up and, standing in his stirrups, put his hand and part of his arm down the hole. Something startled the horse, and before it could be checked it moved off, leaving its rider helpless and suspended by his imprisoned arm. He hung there till he died—a dreadful fate indeed.

Another almost similar case, also in Australia, took place, when the victim actually managed to cut through the wrist joint with his knife and so freed himself; but alas, only to die of haemorrhage.

These two bush tragedies have always greatly impressed me.

Our poor passenger was indeed in a parlous way, suffering from shock and a compound fracture of the arm, near the elbow. To use the conventional phrase descriptive of such occasions, "he was made as comfortable as the circumstances would permit and kept in his berth". After some distressful days of pain and fever it was seen that the injured limb had developed blisters, become mottled, and, in the language of his shipmates, "stank like a dead corpse". Later, it became black, moist, and the cadaveric odour of his cabin was utterly unbearable. Constitutional symptoms were much in evidence—a high fever and at times delirium. In short, gangrene had supervened. To the kindly, common-sense sailors it seemed quite clear that mortification was present and that if something active was not done, and done quickly, the poor fellow would surely die.

After a consultation, in which the patient took a prominent part and gave the casting vote, it was decided to amputate the limb through the healthy tissues higher up. The carpenter was unanimously chosen as the operator, perhaps rightly so, being one whose business made him familiar with saws and cutting tools. "Chips" accepted the unloved responsibility and went forward to sharpen his knife and saw and "to get the other instruments ready". I do not know what they were. When their preparations were completed, alcohol, in the shape of excellent rum, was freely given, and with some short excitement the patient apparently soon sank into the desired state of alcoholic coma. He was indeed really and truly to all appearance paralytically drunk. A suitable ligature to act as a tourniquet was chosen, namely, a stout, soft piece of spun yarn. This, applied round the upper part of the arm and tightened, somewhat after the fashion of a "Spanish windlass", effectively controlled the circulation.

The saloon made the theatre, the cuddy table the place of operation. How well I remember such a scene, for I have myself taken part in three very similar events.

Assisting the carpenter came the sturdy second mate, while some of the apprentices stood around to hold the patient down and onto the table, for there was a lot of movement at the stern in the running ship, and the seas were not small.

When the carpenter, filled at first with the valour of ignorance, attempted to make the proposed incisions, the patient violently struggled. He was not indeed so dead to the world as some of these experts in such states believed him to be. This unexpected disturbance completely unnerved poor "Chips", who fell down on the deck in a dead faint. What was to be done? The second mate, with commendable grit and a fairly steady hand, took the knife, which also was lying beneath the table, and with one heavy sweep of the blade severed, after the fashion of a circular incision, all the soft tissues down to the bone, which was at once sawn through, and the limb was removed. It was really just such an amputation as many of us did in the Great War, in which a specially lethal form of sepsis, so often present, made a better kind of incision and a proper closure of the wound inadmissible. No effort to tie the individual blood vessels was made, nor did they try to stop the bleeding by "paying the open stump with hot pitch", as had been sometimes done at sea in years long before the time of this affair. The one big efficient constrictor was alone relied upon and left *in situ*. The tissues distal to it sloughed, of course, in due season, the band itself became loose, and the stump remained with only a limited area of raw surface to be covered. I do not know what sort of a dressing was applied to the stump, but, remembering what things were likely to be on board, I think it probable that they used oakum—not a bad dressing. Anyway, "the limb was kept cool by applications of snow, of which there was a heavy fall at the time".

After a stormy convalescence the patient at length recovered, and the ship, hastening slowly, came to England.

The patient's general condition was good, and that of his arm not at all bad. Of course, the end of the bone protruded, but was attended to later in hospital with complete success, just as during the War secondary amputations were needed to complete the cure of cases not very dissimilar to that I have now narrated.

Ah well! Such conditions and such happenings have all passed away from the ordinary possibilities of sea travel, so that the overfed, pampered passenger of today in his luxury liner may embark without fear and take his ease and his pleasure on the ocean. No longer shall he sometimes go short, or get wet, or chilled, or be battened down, or dealt with cruelly after the fashion I have described, but rather let him be carefree and suitably clad, in an air-conditioned cabin, take his morning fruit in bed and his eleven o'clock beef-tea well wrapped up and out of draughts.

If he finds himself "off colour" he can stay in his stateroom and telephone to the bedroom steward that he thinks he had better have lunch in his berth.

where he may quite possibly complain that "the quail on toast is not done in the way he approves of". I sometimes wonder which kind of life makes the better individual.

Safety, reliability and solid comfort at sea are all proper things, and matters for pride and satisfaction, but needless, blatant luxury offends and is unseemly on a ship. I fear it makes certain people harbour the kind of sour thoughts from which, in some twisted natures, springs Bolshevism.

PRELIMINARY TREATMENT IN RELATION TO THE THERAPEUTIC IRRADIATION OF MOUSE TUMOURS.¹

By WARNSFORD MORPETT, M.D., Ch.M.
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University of Sydney.)

PART I.

A STANDARD tumour strain was treated with X radiation and a comparison was made of the effect or modification induced by means of various forms of preliminary treatment—diathermy, tuberculin injection and potassium iodide injection.

There is a considerable amount of experimental evidence⁽¹⁾ to show that the therapeutic irradiation of implanted tumours does not depend merely upon a direct injury to the malignant cells, but rather on a complex effect in which the stroma is stimulated to form a defensive reaction. Histological investigations indicate that similar factors operate in the treatment of human tumours.⁽²⁾

The present work was carried out on an empirical basis in order that results would be independent of any such controversial matter, but in this and future communications some attempt will be made to classify the various methods of treatment according to their probable mode of action: (i) inhibition or stimulation of stroma, (ii) preliminary partial injury to tumour cells, (iii) increase in effective value of radiation by scattering or fluorescent substances, (iv) modification of the vascular supply, (v) specific chemical agents which modify the respiratory or glycolytic activities of cells.

Technique.

A transplantable mouse sarcoma, S-37 of the Imperial Cancer Research Fund, was inoculated under the skin of the back and X radiation was applied about one week later, when the growth was the size of a pea. The animal was immobilized by means of silk stitches passed through folds of skin and a lead port, one square centimetre in area, permitted irradiation of the tumour and a narrow margin of surrounding normal tissues. A dose was applied which would retard growth without effecting

¹ This work was carried out under the control of the Cancer Research Committee of the University of Sydney and with the aid of the Cancer Research and Treatment Fund.

a cure, because it was thought that this would provide a better means of comparing the effect of different preliminary treatments. A Coolidge water-cooled deep therapy tube was operated at 120 kilovolts constant potential, 10 milliampères, with a filter of one millimetre of aluminium and a focal distance of 63 centimetres. Exposure lasted for one hour and a Gaiffe-Gallot intensiometer⁽³⁾ indicated a dose of 530r, except in a few early experiments, when 400r were given.

In the first series of experiments [Table I (A)] successive batches of four animals were selected with rapidly growing healthy tumours of approximately equal size. In each batch of four one animal was marked as a control, another received X radiation only (control radiation), a third preliminary diathermy followed by X rays, and the fourth preliminary tuberculin injection followed by X rays. Each horizontal line in Table I represents such a batch.

When preliminary diathermy treatment was given, the animal was anaesthetized and the current was applied over the tumour region for about twenty seconds. Investigation with a small thermocouple revealed a preliminary skin temperature of about 30° C., a low value caused by the necessity of wetting the hair with salt solution to conduct the current. An average temperature of 46° C. was obtained in the substance of the growth, whilst the highest temperature attained just under the skin was 55° C.

When preliminary tuberculin treatment was given, 0.5 cubic centimetre of tuberculin (diluted to 1 in 100 in saline solution) was injected, in the hope of producing a focal reaction. An attempt was always made to give the injection into a tail vein, but when this failed the material was given subcutaneously near the tumour. The three irradiated animals (the control animal that was irradiated, the animal that received diathermy and irradiation, the animal that received tuberculin and irradiation) were exposed together in such a position that the X ray intensity was practically uniform.

In a later series of experiments [Table I (B)] diathermy and tuberculin were administered to non-irradiated animals, whilst a control tumour was retained to check any variation of growth rate. As a further check [Table I (C)] all categories were treated together by selecting batches of six animals, and most of the non-irradiated specimens received the trauma of being stitched to a frame for a period of one hour.

Observations were made at two-day intervals for from seven to seventeen days, or until some of the growths were very large (three to four centimetres diameter) and the animal was moribund. In other cases the experiment was closed when any of the tumours became stationary or tended to retrogress. On two occasions a group of animals was rejected because one or more members were lost before the seventh day. Such accidents are obviously less likely to happen in small batches (Series A and B) than in large batches (Series C).

In order to avoid any errors from unconscious bias, measurements were made by a technician who was unaware of the treatment given. The figures in the table represent the ratio of the final diameter to the (initial) diameter at the time of treatment. There was every reason to believe that the tumours represented in a horizontal direction in the table would be uniform, since the original inoculation throughout each batch was carried out from a small homogeneous portion of parent tumour.

Discussion of Results.

An inspection of the vertical columns of Table I will reveal very diverse growth ratios. There is no reason, however, for uniformity in this case, since each line represents a different batch of experiments, with differing observation periods, whilst the natural growth rate may vary with each implantation, owing to the variable contamination with stroma and necrotic material. Such contaminations may give rise to a slowly growing fibrous tumour, which does not readily respond to any experimental treatment (line 5, Table I).

The most important cause of variation in growth ratio is the deliberate selection of different initial sizes on different occasions. For example, a one centimetre growth may increase fourfold, whilst a two millimetre tumour may increase twenty times. Such large ratios are not reliable, since one has to estimate a small initial diameter by palpation through the skin, and three millimetres may be taken as the limit in this direction.

The varying conditions described above probably help to avoid certain errors of interpretation which might arise with uniform experimental conditions. For example, very young and very old necrotic tumours might differ considerably from the normal response. The question arises as to how many batches of experiments should be completed before an average is made. Division into Series A, B and C on a chronological basis provides a convenient test. The average growth ratio (4.9) in control Series A compares well with the average (4.6) in control Series B, but the average (6.8) in Series C is higher, giving a final value of 5.4 for an average of 12.5 days. According to plan, the X radiation alone results in a lowering of growth rate which is definite but not sufficient to mask any further inhibition from the preliminary treatment. In Series A the rate is reduced to 73% and in Series C to 50%, the more rapid initial growth rate here resulting in increased radio-sensitivity.

The combination of X radiation with preliminary diathermy was a more powerful repressant, the final ratio being 2.6, with partial results 2.4 and 2.9 respectively. Tuberculin also reinforced the X ray action, although the final figure (3.0) is not quite so good as that obtained with diathermy and X radiation.

Diathermy alone showed practically no effect in Series B, but there was a slight retardation in Series C, possibly owing to more rigorous application with increasing experience. The final result

TABLE I.

| Growth Ratios. | | | | | | Observation Days. |
|--------------------------|--------------------|---------------------------|----------------------------|--------------------|---------------------|-------------------|
| Control. | Control Radiation. | Diathermy plus Radiation. | Tuberculin plus Radiation. | Control Diathermy. | Control Tuberculin. | |
| A— | | | | | | |
| 5.0 .. | 3.0 | 3.0 | 2.5 | | | 14 |
| 4.0 .. | 3.0 | 1.0 ¹ | 2.5 | | | 13 |
| 6.0 .. | 4.0 | 1.0 | 2.5 | | | 17 |
| 2.0 .. | 3.0 | 4.0 | 2.0 | | | 14 |
| 2.0 .. | 2.0 | 2.0 | 2.0 | | | 10 |
| 12.0 .. | 8.0 | 3.0 | 8.0 | | | 14 |
| 4.0 .. | 4.0 | 2.5 | 1.0 | | | 14 |
| 4.0 .. | 1.5 | 8.0 | 3.0 | | | 7 |
| Average : 4.9 .. | 3.6 | 2.4 | 2.9 | | | 13 |
| B— | | | | | | |
| 2.0 .. | | | | 1.5 | 3.0 | 7 |
| 2.0 .. | | | | 3.0 | 5.0 | 10 |
| 8.0 .. | | | | 8.0 | 8.0 | 14 |
| 3.0 .. | | | | 3.0 | 7.0 | 14 |
| 8.0 .. | | | | 6.0 | 7.5 | 14 |
| Average : 4.6 .. | | | | 4.3 | 6.1 | 12 |
| C— | | | | | | |
| 15.0 .. | 4.0 | 3.5 | 3.0 | 12.0 | 12.0 | 12 |
| 3.5 .. | 3.0 | 3.0 | 2.5 | 2.5 | 5.0 | 10 |
| 3.0 .. | 2.0 | 1.5 | 1.5 | 2.0 | 2.0 | 10 |
| 6.5 .. | 5.0 | 2.5 | 6.0 | 5.0 | 8.0 | 17 |
| 3.0 .. | 3.0 | 2.0 | 3.5 | 2.5 | 3.0 | 17 |
| 10.0 .. | 3.5 | 5.0 | 2.0 | 10.0 | 9.0 | 10 |
| Average : 6.8 .. | 3.4 | 2.9 | 3.1 | 5.7 | 6.5 | 13 |
| General average : 5.4 .. | 3.5 | 2.6 | 3.0 | 5.0 | 6.3 | 12.5 |

Total experiments : 83.

¹ Stationary tumours usually retrogress.

(5.0) scarcely differs from the control value by more than the experimental error. This was consistent with the initial object that the preliminary treatment should not of itself cause an appreciable effect on the growth ratios.

The tuberculin controls, however, provided a surprise, since the final growth ratio (6.3) is definitely high, owing to the high values in Series B. The notes were checked to see if this could be attributed to a mechanical effect of subcutaneous injection, but it was observed in a number of tail vein injections. The slight opposite effect observed in Series C, however, made one suspect an accidental variation.

Microscopic Examination.—Three animals in each category, eighteen in all, were sacrificed three days after treatment for microscopic examination. This period was chosen because it was thought that the supplementary treatment might cause early modifications of the stroma, which might be obscured in the later secondary effects characteristic of a retarded tumour growth. Under conditions of maximal virulence the sarcoma (S-37) cells invade tissues singly without any reaction, but two of the controls examined showed a slight peripheral leucocyte infiltration. Tuberculin alone appeared to increase this infiltration, and again this was independent of subcutaneous injection. In the case

of diathermy alone there was no definite evidence of increase in the true peripheral reaction, but regions of tumour killed by over-heating rather complicated the picture, and the normal tissues were also inflamed, although there was no necrosis here.

Radiation alone produced a number of characteristic, swollen, degenerate tumour cells⁽⁴⁾ and there was clear evidence of the early formation of a fibro-cellular boundary, which is fairly characteristic, as also are the deep regions of necrosis.

Radiation plus tuberculin produced an inconclusive picture, since the peripheral reaction was less evident than that of tuberculin alone, although there was some evidence of leucocyte invasion of the tumour mass. All irradiated specimens showed swollen tumour cells and massive areas of necrosis, but the latter was extreme in the diathermy plus radiation experiments. As before, the true peripheral reaction sought for was very indefinite, though there were many regions of sharp delimitation at the margin of necrotic areas. Although necrosis is irregularly distributed in the central regions of both normal and irradiated tumours, the distribution in the diathermy experiments suggested that variations in resistance to the diathermy current were important factors. Necrosis might be observed deep in the tumour bed with overlying regions of apparently healthy malignant cells.

Further Experiments.

It was thought advisable to carry out further work with tuberculin as there had been indications of an opposite effect in the controls and irradiated specimens. These experiments, recorded in Table II, were subject to certain technical improvements as the result of previous experience. In the first place, all non-irradiated animals received the trauma occasioned by stitching to a frame, and all injections were given in the tail veins, although in a few cases, when the vein was only torn, the fluid appeared to escape by perivascular lymphatics. The period of observation was reduced to ten days in all cases, since, after this time, central necrosis becomes prominent and it may evolve a phenomenon known as concomitant immunity that has little or no counterpart in the spontaneous tumour of man, which represents the ultimate goal of the present research. The importance of selecting equal initial sizes throughout was also realized, but this would be very extravagant of mice, apart from the impossibility of making accurate estimations in every case. As a compromise the average initial sizes were made equal to 0.5 centimetre for each vertical column by arranging small errors of excess or defect to balance with successive batches of animals. (With unequal sizes one is inclined to follow an old biological precept of weighting conditions against the experiment by assigning the most powerful depressing agent to the largest tumour. This method is fallacious, since, owing to central necrosis and concomitant immunity, there is no guarantee that a tumour which has commenced to grow rapidly will continue in such a manner.)

It will be seen from Table II that an opportunity was used for testing potassium iodide with the above work. Several considerations appeared to justify such an empirical trial. Potassium iodide is not a substance which is rapidly destroyed in the body, nor is it highly toxic, whilst it has a well known pharmacological activity in assisting the absorption of syphilitic swellings.

There was also a possibility that the heavy element iodine should reinforce the X ray action. Dr. Harker⁽⁵⁾ has recently shown that small amounts of potassium iodide may catalyse the oxidation of potassium metabisulphite by means of X radiation. Here again was a possible mechanism.

for modifying the X ray response, since oxidative reactions are considered to play a fundamental part in this respect.

The potassium iodide for test was a 0.25% solution in distilled water, and the mouse received 0.5 cubic centimetre, or 1.25 milligrammes. This gives a concentration of 1 in 20,000 in an animal weighing 25 grammes, which is equivalent to 50 grains in a ten-stone man.

Discussion.

A comparison of Table II with Table I will show a confirmation of the observation that tuberculin reinforces X ray action.

In all, 23 pairs of experiments were carried out, and this favourable action was observed in 14, whilst there was equal growth in four and a reversed effect in five. A clinical trial would appear justifiable, particularly with a more concentrated product, although the possibility of a slight stimulation of non-irradiated growths must be borne in mind. This is indicated in Tables I (B) and II, but not in Table I (C). A possible explanation of both phenomena is associated with some focal "inflammatory" reaction of the stroma, in the one case providing a tumour bed which is more easily invaded, and in the other an enhancement of the defensive reaction, which appears to be evoked by a suitable dose of X radiation. (The tuberculin would appear to act as a non-specific foreign protein. It is not suggested that the phenomenon is related to the tubercle bacillus.)

In the case of the control diathermy experiments (Table I) it may be supposed that any inflammatory reaction of the tumour bed is balanced by partial injury of the tumour cells and that the general growth rate is scarcely altered. In the irradiation specimens shrinkage is even more pronounced than with tuberculin and the results appear to be valid, in spite of some irregularities. It is impossible to say whether the action merely represents the summation of two injurious stimuli or an indirect effect from vaso-dilatation, which is well known to increase X ray action. Preliminary diathermy has been advocated elsewhere⁽⁶⁾ as an adjuvant to clinical radium and X ray treatment, but application would be limited to accessible growths.

TABLE II.

| Observation. | Control. | Control Radiation. | Potassium Iodide plus Radiation. | Tuberculin plus Radiation. | Control Potassium Iodide. | Control Tuberculin. |
|------------------------------------|----------|-----------------------|--|----------------------------------|------------------------------|------------------------|
| Growth ratios for a ten-day period | 2.5 | 5.0 | 4.0 | 4.0 | 2.5 | 2.5 |
| | 2.5 | 1.5 | 2.0 | 2.0 | 1.5 | 3.0 |
| | 3.0 | 2.5 | 3.0 | 4.0 | 3.5 | 3.0 |
| | 7.0 | 5.5 | 4.0 | 2.0 | 5.0 | 8.5 |
| | 10.0 | 3.0 | 6.0 | 3.0 | 3.5 | 12.0 |
| | 8.5 | 3.5 | 9.0 | 3.0 | 7.0 | 8.5 |
| | 8.0 | 3.0 | 2.5 | 3.0 | 10.0 | 7.5 |
| | 5.5 | 6.0 | 3.0 | 4.0 | 10.0 | 4.0 |
| | 5.0 | 3.0 | 2.0 | 1.5 | 5.0 | 7.0 |
| | Average | 5.8 | 3.4 | 3.9 | 5.3 | 6.2 |

Total experiments: 54

TABLE III.
Summary of Results.

| Series and Number of Batches. | Control. | Control Radiation. | Diathermy plus Radiation. | Tuberculin plus Radiation. | Potassium Iodide plus Radiation. | Control Diathermy. | Control Tuberculin. | Control Potassium Iodide. |
|-------------------------------|----------|--------------------|---------------------------|----------------------------|----------------------------------|--------------------|---------------------|---------------------------|
| A (8) | 10.0 | 7.3 | 4.9 | 5.9 | — | — | — | — |
| B (5) | 10.0 | — | — | — | — | 9.3 | 13.0 | — |
| C (6) | 10.0 | 5.0 | 4.2 | 4.6 | — | 8.4 | 9.6 | — |
| Table II (9) | 10.0 | 5.9 | — | 5.0 | 6.4 | — | 11.0 | 9.1 |
| Weighted average | 10.0 | 6.2 | 4.6 | 5.2 | 6.7 | 8.8 | 11.1 | 9.1 |

Potassium iodide showed no effect which could be distinguished with the order of accuracy of the nine sets of experiments recorded, and it was not considered advisable, in the absence of definite indications, to commence the large number of experiments which would be necessary to exclude the possibility of small differences.

Table III gives a convenient summary of results. Growth ratios are divided by a factor so that the non-irradiated control shall be represented by 10. The second digits are obviously inaccurate, but the general similarity of results obtained in the different series of experiments (Table I, A, B, C, and Table II) inspires confidence.

Conclusions.

1. Preliminary tuberculin injections definitely aided the X ray shrinkage of the tumours in 14 out of 23 controlled experiments, made no difference in four, and gave a reverse effect in five. Unavoidable variations in growth rates might explain these reverse effects.

2. Tuberculin injections alone, that is, without subsequent irradiation, appeared to stimulate nine out of twenty growths treated in that way, made no difference in five, and gave a reverse effect in six.

3. Preliminary diathermy treatment also aided the X ray shrinkage (eight times, three equal, three reverse), while diathermy alone caused little change.

4. Potassium iodide injections showed no appreciable effect, either on irradiated or on non-irradiated tumours.

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I wish to thank Dr. N. E. Goldsworthy for the sample of tuberculin, and Messrs. W. Watson and Sons Limited for the loan of a diathermy apparatus

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⁽³⁾ W. Moppett: "A Note on Apparatus Used in the Biophysical Laboratories of the University of Sydney", *The Journal of the Cancer Research Committee of the University of Sydney*, Volume V, Number 3, 1933, page 155.

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Reports of Cases.

APPENDICITIS IN A FEMORAL HERNIA.

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The presence of an inflamed appendix in a femoral hernia is sufficiently rare to warrant placing its occurrence on record. During the thirteen-year period 1922-1935, only two such cases occurred at the Royal Melbourne Hospital; this represents 0.87% in a series of 230 cases. Shawan and Altman⁽¹⁾ report a series of 97 cases of femoral hernia, the appendix being present in three.

The patient, a single woman, aged sixty-five years, had never noticed a lump in the groin until November 18, 1935. She had always been constipated, but with the aid of mild aperients she could keep the bowels regular. Three years before, in January, 1932, she was awakened at night with pain all over the abdomen, accompanied by vomiting. After resting in bed for two days this subsided.

On November 10, 1935, she complained of an aching pain in the lower part of the abdomen, most marked on the right side. This pain subsided, but four days later, as she stepped out of a train, she felt a jerk in the right groin, which became painful the next day. On examination a tender mass was found in the right groin below Poupart's ligament, with no detectable deep attachment and no impulse on coughing. The pain persisted for a week, but subsided gradually under plasters and rest in bed. There was no rise in temperature, no nausea or vomiting, and no bowel disturbance, except on one day, when they were difficult to move. A fortnight later the lump was still present, but had decreased in size; it was freely movable in the subcutaneous fat, there was no impulse on coughing, and small glands could be felt surrounding it. The patient remained well until the time of operation.

On January 28, 1936, the mass was explored under local anaesthesia. When the subcutaneous fat was separated from the mass it was found to be a femoral hernia with a narrow neck. On opening the sac a swollen appendix was found adherent to the sac wall by recent adhesions and almost completely filling the sac. The proximal half inch of the appendix remained in the abdominal cavity. To remove the appendix it was necessary to divide Poupart's ligament over the neck of the sac. The sac was transfixed and ligated at its base and removed following appendicectomy. The *falx inguinalis* was sutured to Cooper's ligament, following Lotheissen's method, and Poupart's ligament was sutured. The patient made a satisfactory convalescence.

This condition might readily be confused with a suppurating inguinal adenitis if gangrene or perforation

developed in the appendiceal wall. Simple incision would result in the development of a faecal fistula with failure to effect a permanent cure. A case illustrating this is reported by Johnstone.¹⁰

A critical survey of the Royal Melbourne Hospital series will be published at a later date.

The presence of an inflamed appendix in a femoral hernia should be remembered when a painful mass develops in the groin, for which no infective or constitutional cause can be discovered. There may be no symptoms of sufficient moment to direct attention to abdominal contents as a cause for the condition.

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¹⁰ Harold K. Shawan and Raphael Altman: "Review of Cases of Femoral Hernia at the Detroit Receiving Hospital and Detroit Grace Hospital", *Annals of Surgery*, Volume CI, 1935, page 1270.

¹¹ A. S. Johnstone: "Appendicitis in a Femoral Sac, with Adventitious Vascularization of a Segregated Appendix", *The British Journal of Surgery*, Volume XXI, 1934, page 544.

A FATAL CASE OF ASTHMA IN INFANCY.

By MICHAEL KELLY, M.B., B.S. (Adelaide),
Bunbury, Western Australia.

IN view of the remarks on infantile asthma published in THE MEDICAL JOURNAL OF AUSTRALIA of April 18, 1936 (page 546), the following case may be of interest.

Fatal cases of asthma in infancy are apparently extremely rare; and, according to an American observer, death comes as the result of pulmonary oedema caused by dysfunction of the permeable alveolar capillaries, the whole picture resembling one of anaphylactic shock. This would appear to be confirmed by the following.

R.K., a boy of eighteen months, was seen at 5 p.m. on December 7, 1933. He had been ill only since 8 a.m. There was no history of any unusual diet or of exposure to any unusual environment. The complaint was breathlessness, and the mother was insistent that he had never previously suffered from this. He was a well nourished boy in extreme respiratory distress. The chest was fixed in full expansion and he was ineffectually gasping for breath and giving a short cry with each expiration. He looked exhausted. There was no cyanosis, but the skin was very pale. The voice possessed good tone, and there was no sign of laryngeal obstruction. The pulse was uncountable, and the respiration rate was over eighty.

The percussion note was almost tympanic all over the chest. Wheezing rhonchi of all descriptions were heard all over the chest, and their intensity was greater in expiration than in inspiration. On listening carefully, a shower of crepitations was heard at the end of inspiration.

The urine showed no abnormality and the temperature was 37.1° C. (98.8° F.).

In spite of treatment the boy's condition steadily became worse, and he died, completely exhausted, at 4 a.m. on December 8, twenty hours after the onset of the illness. A *post mortem* examination was refused.

Reviews.

PROGRESS IN MEDICINE.

It is a pleasant duty to announce the appearance of a new edition, the eighth within twelve years, of "Recent Advances in Medicine". Since its first publication "Beaumont and Dodds" has been translated into at least one foreign tongue and has constituted itself a *vade mecum*, a clinical and therapeutic pocket breviary for all who

¹ "Recent Advances in Medicine, Clinical, Laboratory, Therapeutic", by G. E. Beaumont, M.A., D.M., F.R.C.P., D.P.H., and E. C. Dodds, M.V.O., D.Sc., Ph.D., M.D., F.R.C.P.; Eighth Edition; 1936. London: J. and A. Churchill. Demy 8vo, pp. 467. Price: 12s. 6d. net.

concern themselves with the disconcertingly rapid march of modern medicine. That the book should be popular need cause no wonder. Its distinguished authors, in the first place, have a flair for lucid exposition, coupled with an ability to distinguish the true from the false and to employ the very difficult art of condensation to the best advantage. They have a talent, so to say, for cutting away superfluous fat, thus enticing the reader to dig his teeth into real meat. Secondly, through some mysterious fitness for collaboration, they have succeeded in keeping their book within the limits of its size as originally published; it has not grown in girth year by year, a fact due to the ruthless excision of all tests and methods which have proved unsatisfactory with the passage of time. Thus it is that the new volume, though the last word in modernity, is only thirty-five pages longer than the edition of two years ago.

All this has necessitated a revision, but not in any sense a recasting, of the book. The fresh material includes new information upon the pituitary, upon sex hormones and antihormones, and upon the thymus gland. For the first time there is an adequate discussion upon the chloride content of body fluids in relation to Addison's disease, and for the first time also a 6:1 ketogenic diet replaces the old 3:1 ratio in the treatment of urinary infections. Another introduction is that of oral administration of dye in cholecystography, a method which has now completely replaced the employment of the intravenous route. In a short review it is impossible even to enumerate the titles of the excellent articles comprising the book; but the sections upon the anemias and agranulocytosis throw clear light upon what are admittedly very difficult and complex subjects. As with previous issues, the present edition contains a complete index and an accurate and lengthy bibliography.

HIGH BLOOD PRESSURE.

DR. HUGH O. GUNEWARDENE's book may be recommended to advanced students of medicine and to physicians.¹ The author rightly emphasizes the fact that vascular hypertension is better manifested by the height of the diastolic pressure, which is stable, than by that of the systolic, which fluctuates within wide limits. He considers a diastolic pressure above 90 millimetres of mercury to be abnormal, and states that if the pressure is elevated to the level of 115 or over it can never again reach a safe level. The author quotes the astounding figures of the American observers Major and Fahr. They estimate that ten million persons in the United States of America suffer from high blood pressure. The writer also substantiates a statement made in a commentary published in this journal a few months ago, namely, that hypertension is by far the greatest causative factor in the aetiology of heart disease. In discussing such matters as the cause of high pressures in obviously healthy people, Dr. Gunewardene treads delicately, nor does he devote much space to the discussion of this condition in young adults, a condition, be it said, which greatly perplexes the statisticians of life assurance companies. In Chapter V of the book the effects of various occupations and modes of living upon blood pressure are interestingly discussed. Any work demanding extraordinary physical effort, says the author, is commonly productive of low readings. In the section on treatment the author states that a fall in pressure sometimes follows the removal of septic foci, and instances the experience of O'Connor, who found that in cases of prostatic enlargement with renal damage the operation of prostatectomy was succeeded by a drop in the pressure figures. The employment of vaso-dilator drugs is recommended, together with the adoption of a rather rigid dietary scale. The book contains an excellent index, but no bibliography is appended.

¹ "High Blood Pressure and its Common Sequelæ", by H. O. Gunewardene, M.B., B.S., D.M.R.E.; 1935. London: Baillière, Tindall and Cox. Demy 8vo, pp. 182, with illustrations. Price: 7s. 6d. net.

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MAN.

PHILOSOPHER, theologian, psychologist and devotee of science have for long sought, and are still seeking, to discover the nature of man; they are not alone in their search. It has been said that the most powerful emotion in man is his yearning toward the unknown. Man is always turned toward the new, he has an insatiable curiosity, a thirst for knowledge. There must be very few who have not at some period of their lives asked with Walt Whitman: "What is a man anyhow? what am I? what are you?" Were we able to answer this question we should hold the key to the riddle of the universe. Much that is hypothetical and nebulous has been elaborated and much that is accurate discovered; we are so constituted, however, that the hypothetical and the accurate may be confused in our minds. This confusion may or may not be disadvantageous, but it will be admitted that progress is more likely to be made in our adventures if we use ascertained facts as a starting point. Dr. Alexis Carrel has given us a book, "Man, the Unknown"¹ that may be used in this way, for it

contains "a simple account of the facts revealed about human beings by scientific observation".

In setting out to write this book, Carrel faced an enormous task; he realized its difficulty, but he undertook it, so he states, because someone had to undertake it. He thinks that men cannot follow modern civilization along its present course without degenerating. They have been fascinated by the beauty of the sciences of inert matter. They have not understood that their body and consciousness are subjected to natural laws, more obscure than, but as inexorable as, the laws of the sidereal world. They have not realized that they cannot transgress these laws without being punished. He holds that men must learn the necessary relations of the cosmic universe, of their fellow men and of their inner selves, and also those of their tissues and their minds. Throughout his book the author has necessarily gone into considerable scientific detail, particularly of human physiology; the intelligent non-medical reader, however, will have little difficulty in following the argument, and both medical and non-medical readers will find the book a source of delight and profit.

After showing that much less progress has been made in the sciences of life than in those of what he calls inert matter, Carrel states that man, as known to the specialists, is far from being the concrete, the real, man. We do not apprehend man as a whole; we know him as composed of distinct parts, and even these parts are created by our methods. "Each of us is made up of a procession of phantoms, in the midst of which strides an unknowable reality." The science of man is the most difficult of all the sciences. In spite of this difficulty, Carrel would have us make the most of the available data. He pleads for a balanced outlook, but since over-emphasis has been given to the purely scientific, he devotes much discussion to the intellectual, spiritual and moral aspects of man. He shows that mental deterioration is far more dangerous for civilization than infectious diseases. He points out that the education dispensed by schools and universities consists chiefly in a training of the memory and the muscles, in the inculcation of certain social manners, and in a

¹ "Man the Unknown", by A. Carrel; 1936. Australia: Angus and Robertson, Limited. Demy 8vo, pp. 267. Price: 8s. 6d. net.

worship of athletics. He asks whether such disciplines are really suitable for modern men, who need above all things mental equilibrium, nervous stability, sound judgement, audacity, moral courage and endurance. He also asks why hygienists behave as though human beings were exclusively liable to infectious diseases, while they are also exposed to the attacks of nervous and mental disorders and to weakening of the mind. Man needs a way of life involving constant struggle, mental and physical effort, physiological and moral discipline, and some privations. Such conditions inure the body to fatigue and to sorrows; they protect it against disease, and especially against nervous disease; and they drive man to the conquest of the external world. Man's adaptive functions are great, but he should not be exposed to conditions of existence to which he is unadaptable. Carrel thinks that no adaptation is possible to ceaseless agitation, intellectual dispersion, alcoholism, precocious sexual excesses, noise, polluted air and adulterated foods. Man must fight such an environment, even at the cost of a destructive revolution. "After all, the purpose of civilization is not the progress of science and machines, but the progress of man."

In an interesting chapter on mental activities Carrel discusses the intellectual, the moral, the aesthetic and the mystical. He deals with clairvoyance and telepathy, asceticism and contemplation, prayer and miracles. Strangely, he does not mention the Eastern school of *Yoga*, in which the human mind is disciplined to a very remarkable degree, and which was considered, though perhaps not sufficiently, in connexion with the recently reported fire-walking experiments in England. In discussing "inward time", defined as the changes of the body and its activities during the course of life, and also as a dimension of ourselves, Carrel writes: "Our personality is enriched by each new experience of our organs, humours and consciousness. Each thought, each action, each illness, has definite consequences, inasmuch as we never separate ourselves from our past." This is a disturbing and perhaps salutary idea. It recalls what may be regarded as its expanded corollary, the doctrine of the "Eternal Now", the state of Brahma

in which everything is everywhere and always. Although Carrel does not actually reach such a point, he seems to be leaning towards the conception of man as a four-dimensional instead of a three-dimensional being.

As might be expected, the author has a special message to all who are concerned in the teaching and practice of medicine; for this reason, if not on account of its extraordinary general interest, medical practitioners will do well to read this book. "Medicine has to take into account the nature of man, of his unity, and of his uniqueness." The individual as well as the disease must be studied. "Medicine, when confining itself to the study of diseases, amputates a part of its own body." We have applied to man concepts belonging to the mechanical world. We have neglected thought, moral suffering, sacrifice, beauty and peace. We have treated the individual as a chemical substance, a machine, or a part of a machine. We have not asked how tissues and consciousness will accommodate themselves to the change in the mode of life imposed upon us. Carrel thinks that medicine could easily enlarge its field and embrace, in addition to body and consciousness, their relations with the material and mental world; that it could take in sociology and economics and become the very science of the human being. He points out that its aim then would be not only to cure or prevent diseases, but also to guide the development of all man's organic, mental and sociological activities. The progress of medicine, as it is today, however, depends, in his opinion, entirely on imagination, on observation of the sick, on meditation and experimentation in the silence of the laboratory, and, finally, on the unveiling, beyond the proscenium of chemical structures, of the organismal and mental mysteries.

A short outline of the main features of Carrel's book has been given. On some of his views there will probably be considerable divergence of opinion. Difference of opinion will not matter; what does matter is that men and women should have breadth of vision and be open to conviction. Not a few who read this book will be convinced that man's destiny is in his own hands.

Current Comment.

STILL-CHAUFFARD'S SYNDROME.

IN American medical literature occasional reference has been made to what is known as Felty's syndrome. This condition was described in 1924 by A. R. Felty as occurring in middle-aged adults. It is characterized by chronic deforming arthritis, splenomegaly, enlargement of the lymphatic glands, leucopenia and cutaneous pigmentation. Secondary anaemia was present in all but one of the five cases described by Felty, and low grade fever was present in two of the cases. H. A. Singer and H. A. Levy have recently had an opportunity of making complete *ante mortem* and *post mortem* examinations of two cases of this interesting condition.¹ Their contribution is of great interest, not only on account of the complete histories of the two cases, but also because of the excellent summary that they give of the literature.

In 1896 Still described the joint disease in children that is known by his name—a condition characterized by "chronic progressive enlargement of joints, associated with general enlargement of glands and spleen". There was also a tendency to moderate anaemia and to arrest of physical development. In the same year Chauffard and Ramond described a somewhat similar condition in adults. These observers noted the occurrence of febrile periods and also pointed out that the enlargement of glands occurred in the neighbourhood of affected joints. They thought that the glandular enlargement was secondary to the joint lesions and that both had an infective origin. Many years later, in 1914, the condition was referred to in European literature as Still-Chauffard's disease. In other words, Still-Chauffard's disease was recognized as an adult form of what is now known as Still's disease. It is quite impossible to attempt to give a *précis* of the voluminous literature quoted by Singer and Levy, interesting though it is. Those who read this article will naturally turn to the question of aetiology. Singer and Levy point out that the microorganisms which have been suspected include those of tuberculosis, syphilis and chronic low grade sepsis. A probable aetiological agent was recovered in 1926 by Reimold and Stoeber. After many failures they succeeded in culturing from the circulating blood of a child with Still's disease a pure growth of *Streptococcus viridans*. *Staphylococcus aureus* has also been recovered from the blood in Still's disease. The evidence in the two cases of Still-Chauffard's disease reported by Singer and Levy (they use the name Felty's syndrome) points to low grade sepsis, probably streptococcal, as the source of origin.

In Singer and Levy's first case the clinical picture was almost identical with that of subacute bacterial endocarditis. *Streptococcus viridans* was

recovered from the blood stream during life and from the spleen after death. The microscopic changes noted *post mortem* included activation of the endothelium; this was noted especially in the spleen, liver and lymph glands, and was indicated by the swelling, increase in number and desquamation of the endothelial cells. Erythrophagocytosis was present. There was a distinct increase in the plasma cells in the spleen and lymph glands, and especially in the bone marrow. Injury to the bone marrow elements, and particularly the granulocytes, was noted, together with subacute glomerulonephritis, evidences of myocarditis and haemorrhages into the cutis. These changes are, as Singer and Levy state, and as Siegmund and Jaffé have shown, typical of those found in *sepsis lenta*. From the second case *Streptococcus viridans* was also recovered, and the changes, though not quite similar to those of the first case, were also those of low grade sepsis.

The joint lesions that can be caused by the streptococcus are so many and varied that it would be well to let this condition be known as Still-Chauffard's syndrome. Felty's name will probably not be used in connexion with it by those who know the literature. When more is known of the streptococcus and its varied activities, the use of the term disease may be justifiable where only syndrome is now suitable. On the evidence that they have brought forward, Singer and Levy are probably justified in their view that the terminal stage in their two cases was the result of a single infection in which the defence mechanism of the host had collapsed.

THE RELATIVE SAFETY OF ANAESTHETICS.

CLIFTON W. HENSON,¹ in a review on the subject of anaesthetics, opens his remarks with the observation that ether affects the circulatory system of normal people only if its administration be greatly prolonged. Employed over periods of more than one hour, it is demonstrably capable of producing progressive arterial dilatation, and when administered to a shocked animal until the corneal reflex is abolished, will cause a fall of blood pressure from sixty-five to thirty millimetres of mercury. Its effects upon the gastro-intestinal tract tend to abolish muscular tone and peristalsis. The recovery is slow, the bowel not resuming its normal function for some hours. Coexistently, there is an increase in the solid components of the blood, of which the coagulation time and oxygenating powers are greatly lessened and the icteric index and sedimentation rate much increased. Experimentally, etherization of dogs brings about degenerative changes in the convoluted tubules of the kidney, fatty degeneration in the central portion of the hepatic lobules, and a lessening of the phthalein output. In six hundred persons given ether, bronchitis developed in 2.5%, bronchopneumonia in

¹ Archives of Internal Medicine, March, 1936.

¹ New York State Journal of Medicine, April 1, 1935.

3·6%; in a like series given ethylene, 0·6% and 1·5% were attacked by bronchitis and bronchopneumonia respectively. Admittedly, the mortality of ether administration is low. Keen's figures reveal only one death in 7,706 cases of ether anaesthesia; McGrath found no death in over 49,000 administrations.

In dealing with the question of nitrous oxide anaesthesia, Henson states that any respiratory and circulatory changes apparent are the result of asphyxia, and that during periods of cyanosis, peristalsis either becomes tumultuous or disappears. There is no increased concentration of blood or alteration of its coagulation time, but otherwise the same alterations in blood composition occur as with ether, and the same may be said of the renal and hepatic changes. Such complications as coronary and cerebral embolism and pulmonary thrombosis seem, on the available figures, to appear in a much greater proportion of cases than occur with ether. Most anaesthetists hold the view that nitrous oxide has no dangers as a narcotic; Gwathmey has stated that the mortality attending its use is only about the order of 1 in 20,000. Yet Baldwin recorded twenty deaths in Columbus, Ohio, within a few years. He always avoided it as an agent for the production of deep anaesthesia, and finally, after the death under nitrous oxide of a strong and healthy youth in his care, abandoned the gas altogether. Owing to the need for its admixture with a correct proportion of oxygen, and for the reason that the signs of deep anaesthesia and of a returning consciousness are extremely alike, the use of nitrous oxide by untrained persons is held to be very dangerous.

Vasomotor paralysis and diminished respiration may follow the use of spinal anaesthesia if the injected solution reaches a level above that of the tenth dorsal segment—a state of affairs sometimes resulting in death. A grave fall of blood pressure, which may not regain its normal height for twenty-four hours, is a not uncommon phenomenon, and it is alleged that degenerative processes may be found in all or any organs of the body. One writer has observed neurological symptoms in seven of eleven patients, and in two of these there were unspecified changes in the spinal cord which were believed to have contributed to a fatal ending. Pulmonary complications, too, are held to be a sequel to subarachnoid anaesthesia over four times as frequently as in inhalational methods. Although the mortality rate, estimated over 250,000 cases, is stated to be only 1 in 3,345 injections, Adam recently put the mortality figure at 1 in 500. He believes the method dangerous and has discontinued its use. Yet there seems little risk surrounding it in careful hands.

"Novocain", in the sphere of local and regional anaesthesia, is admitted on all hands to be relatively non-toxic and as safe as any drug used for the purpose may well be. Nevertheless, the administration of large doses to normal individuals and of small doses to susceptible subjects are noted as

having caused grave toxic symptoms. These are heralded by the onset of convulsions, and unless treatment is prompt and efficient death may follow. One collection of statistics shows that the morbidity following the use of local anaesthesia may be disregarded for the most part. In this series of 4,500 operations there were no deaths from ileus, and the mortality reached the small figure of 0·24%, as compared with that of 1·31% following 610 operations performed under general anaesthesia. In this matter an element of confusion is part of all attempts to compile reliable statistics, since many patients subjected to local and regional anaesthesia are old, debilitated or moribund.

According to Henson, a review of the literature reveals no death from the use of ethylene during the past ten years. It has no adverse effects upon intestinal movements, respiration, circulation, renal function or the central nervous system. The blood picture resembles that seen after nitrous oxide administration, though its outlines are much less distinct, and the hepatic changes are negligible as compared with those produced by ether or nitrous oxide. Apparently the drug has no toxic properties. If an animal is anaesthetized with it until respiration ceases from anoxæmia (and this requires a concentration above 90%), breathing may be restored by artificial respiration. Post-anaesthetic vomiting occurs less than half as frequently after ethylene as after ether, and troubles due to abdominal distension are a mere 4·2% in the case of ethylene, as compared with 36·6% for ether.

Much harm has been done to the cause of ethylene through the common belief that its explosive properties make it a danger to the patient as well as to the surgeon and his assistants. It is a matter of grave doubt whether the risk of explosion during ethylene anaesthesia is any greater than that attendant upon the use of ether. The modern machines, provided with valves which make back-flow impossible, are properly "grounded" to guard against the perils of static electricity, and are so contrived that the anaesthetic has a humidity over the safe level of 60%. One investigator records that no explosion occurred in over 20,000 ethylene administrations. A *questionnaire* on anaesthetic deaths, answered by seven New York hospitals, showed that of 219 deaths under anaesthesia none occurred after ethylene administration. It would seem that ethylene has been shown to be the safest general anaesthetic in general use at the present time; but in America it cannot yet be said that it is administered to more than 1% of patients requiring anaesthesia. This can be due only to inertia and the unwarranted fear of explosion. And since Henson so strongly presses the claims of ethylene and greatly regrets that it is so little used in America, the position in England deserves notice. The "Medical Annual" of 1935 states that ethylene is much less popular in England than it merits, though it is relatively largely employed in America. This publication also notes that an American *questionnaire* elicited the news that over 760,000 ethylene

administrations had been recorded in that country, but that elaborate precautions had been found necessary to avoid static electricity as a cause of explosion. These safeguards, according to the "Medical Annual", are probably unnecessary in the humid climate of the British Isles. The "Medical Annual" of 1936, strange to relate, does not mention the subject of ethylene at all.

TWENTY-FIVE YEARS OF MEDICAL INSPECTION OF SCHOOLS IN VICTORIA.

THE twenty-fifth annual report of medical inspection in the schools of Victoria has been issued by Dr. Jane S. Greig, Chief Medical Inspector. The document is an extract from the report of the Minister for Public Instruction of Victoria for the year 1934-1935. In the report, which is not long, the progress of medical inspection is traced. Work of national importance has been done and the department is to be congratulated on the results achieved and on the scope of its present endeavour.

The department began its work in November, 1909, with three full-time medical officers. Medical inspection in schools was then in its infancy in Australia and the work in Victoria was developed "almost entirely in its own way". As Dr. Greig once wrote in this journal, "it was almost like starting on a blank sheet". Comparatively little was known of the normal child, and a careful examination of the children was therefore undertaken. The cooperation of parents was fortunately obtained without difficulty, and every child was examined in each school that was visited. In the first instance examinations were confined to the metropolitan area. In 1911-1912 the medical examination of school teachers was begun and the medical officers of the department had a voice in laying down standards for the health factors of air, light, seating and cleanliness, and also for new buildings and the remodelling of any school. Medical officers also began to give lectures and demonstrations on hygiene to all students in the Teachers' College and the College of Domestic Economy. Instruction was given on the subject of infectious diseases; later, when definite preventive measures, such as swabbing and immunization for diphtheria and other diseases, were introduced, this work was left in the hands of medical officers of health. In 1912 school nurses were added to the staff.

An important development took place in 1921, when a dental service was added to the activities of the department. The need for such a service may be gathered from the results of a survey, made in 1910, which revealed that only three among five hundred children examined had all their teeth free from caries. The dental service has so extended its activities that during 1934-1935, 28,330 children were treated. In 1925, four school medical officers, four dental officers and four dental attendants were added to the staff. The work was then extended to

the country districts. From 1926 onwards every district in the State was covered.

During the year 1934-1935 the number of children examined was 35,742—18,580 boys and 17,162 girls. In addition, district health officers examined 1,483 children. The number of teachers examined was 1,274—525 men and 749 women. School nurses paid 7,888 visits to the homes of children.

In the last part of her report Dr. Greig envies the expensive setting and the amazing facilities that are provided in other countries for the remedying of school defects, the compulsory prevention of smallpox and diphtheria in Canada, and the general and uniform systems of Great Britain. On the other hand, she points out that in Victoria the system is State-wide and the work is carried out under one authority; the country districts receive exactly the same service as the city; and Victoria is spared some of the worst problems of the Old World—chronic starvation, excessive overcrowding and many Old World diseases are rare. On one fact the State of Victoria may be congratulated—throughout the period of depression no curtailment of medical services was suggested. The happiest feature is that this department, in common with similar services in the other States, enjoys the cooperation of the practising members of the medical profession.

CARCINOMA OF THE TONGUE IN A NEW-BORN CHILD.

A CARCINOMA of the tongue in a new-born child is reported by L. Wallace Frank, C. D. Enfield and A. J. Miller.¹ They point out that Helmholtz studied 750 malignant tumours occurring in children at the Mayo Clinic, that of these 56 were found in the mouth and neighbouring regions; of the 56 tumours only five were squamous-celled carcinomata. Bland Sutton does not mention cancer of the mouth as occurring before twenty-five years of age, but in recent years cancer of the mouth has been reported in children. The child reported by Frank, Enfield and Miller was found at birth to have a swelling on the left side of the tongue; it was the size of a pea and was thought to be a cyst. When it began to increase in size a piece was removed for microscopic examination. A diagnosis of squamous-celled carcinoma of the tongue was made. The growth was widely excised by an elliptical incision extending almost to the mid-line. The raw surface was cauterized with the electric cautery. An examination of the whole specimen revealed squamous-celled carcinoma invading the underlying tissue. X ray treatment was given over the gland-bearing area on the left side of the neck. It is stated that this is the only case of cancer of the tongue reported in a new-born child and that the patient is probably the youngest to have received radiation therapy for malignant disease.

¹ *The American Journal of Cancer*, April, 1936.

Abstracts from Current Medical Literature.

RADIOLOGY.

Pulmonary Changes in Polycythaemia Vera.

I. SETH HIRSCH (*Radiology*, April, 1936) states that circular shadows may appear in any part of the lung fields during the course of *polycythaemia vera*. These shadows vary in size and shape, are sharply circumscribed and not surrounded by infiltration. The lesions rapidly reach a certain definite density and then begin to fade until they disappear completely, leaving no trace of their existence either by fibroid or calcific changes. The entire period from the appearance of such a lesion to its disappearance may be less than three weeks. This evanescence may explain why this change has not been described. These sharply circumscribed shadows must be differentiated from a focus of metastatic malignant disease and a conglomerate tubercle. It is difficult to state the pathological nature of the lesion; most likely it is due to a sub-pleural thrombus or a small hemorrhage.

Calcium Changes and Their Importance in Diagnostic Radiology.

G. HARRISON ORTON (*British Journal of Radiology*, February, 1936) states that "bone-transplant" is a better term than "bone-graft", since there is no evidence that bone which has been transplanted lives, and there is considerable evidence to show that it dies. The fact that a fragment of bone transplanted into another bone dies is supported by X ray evidence, for X ray examinations carried out for some months after operation show that the transplanted portion of bone is denser than the surrounding bone, which means that it is avascular. It may remain so and be tolerated as a prosthesis, or it may be eliminated as a sequestrum; on the other hand, it may form an intimate adherence to the bed in which it is placed and become completely absorbed, by a process of erosion and revascularization, thus setting free the calcium which brings about the formation of new bone. This is briefly the sequence of events in a successful transplant. There is evidence to show that the ultimate result is much the same whether the transplant is autogenous or whether dead bone, ivory, or even a paste of calcium salts is used, one of the chief uses of a bone transplant being to provide a local store of calcium. In this connexion an experiment, made by Hey Groves, is instructive. In a cat's tibia he made three troughs, and in each placed a portion of bone of the same size, the first from the same cat, the second from another cat, and the third a piece of boiled bone. After six weeks, micro-

scopic examination showed no difference between them; each was dead, but in a process of resorption. Thus a bone transplant which may be said to have taken is one that becomes vascularized and decalcified. The important point for the radiologist to remember is that a successful bone transplant is one that eventually becomes rarefied. Calcification of cartilage is frequent, and is probably most often seen by the radiologist in the rib cartilages; it is common in the aged, but may be marked in quite young subjects, and it has been asserted that these calcifications are associated with pulmonary tuberculosis. There is, however, no evidence whatever to support this. The most probable explanation is that fibro-cartilage is one of the least vascular of tissues, and that here there is an example of calcification in a degenerating tissue, the time at which this takes place, like many other degenerations, depending more on the quality of the tissues than on their actual age.

Use of the X Rays in Pulmonary Tuberculosis.

FRANÇOIS B. TRUDEAU (*The Journal of the American Medical Association*, February 22, 1936) selected groups of several hundred consecutive admissions to the Trudeau Sanatorium and made a study of the X ray films of these patients, comparing them with the clinical findings; he then followed the patients in each group for a period of years. He concludes that: (i) The extent of lung involvement greatly influences the prognosis in pulmonary tuberculosis, the death rate being in direct proportion to the amount of disease. (ii) The prognosis in the "exudative" type of disease is decidedly more unfavourable than in the "proliferative" type. (iii) The presence of cavities nearly doubles the probability of death within five years. (iv) Cases in which cavities show improvement under treatment have approximately five times as favourable a prognosis as those in which the cavities become larger during the patient's residence in a sanatorium. (v) Patients in whom the results of comparative X ray examinations are constantly favourable under sanatorium treatment have more than twice as good a chance of being well at the end of a five-year period, and only one-fourth as great a chance of being dead as those who have increased X ray shadows. (vi) Increase in comparative X ray studies suggests a prognosis about equally unfavourable with that indicated by the presence of fever. (vii) Patients with both fever and increased X ray shadows have six times as unfavourable an outlook as those who are free of fever and whose X ray examinations show consistent improvement. (viii) Increased comparative X ray shadows are of much graver prognostic significance than increased physical signs (râles). (ix) The

yearly follow-up records of 600 patients show that the relation of "well", "relapsed but now well", "chronic", and "dead" is in direct ratio to the increase of abnormal X ray appearances while the patients were under treatment.

Radiological Changes in Malacic Diseases of Bone.

JOHN D. CAMP (*Radiology*, April, 1936) states that hyperparathyroidism has been well established as a clinical entity, and it is now recognized that the condition may be caused by a hyperfunctioning adenoma of one parathyroid gland (rarely two) or by generalized primary hyperplasia of all the parathyroid glands. Hyperplasia can also occur without evidence of hyperparathyroidism. This type is designated as secondary, functional, or compensatory hyperplasia and may occur in association with generalized lesions, such as rickets, osteomalacia, multiple myeloma and metastatic carcinoma, which involve the skeletal system. In such conditions the hyperplasia occurs because of the demand for parathyroid hormone to maintain the normal amount of the serum calcium. In hyperparathyroidism which results from generalized hyperplasia of all parathyroid glands, there apparently exists some factor which promotes all parathyroid tissue to produce more hormone than is needed. Radiologically, the fundamental skeletal change in hyperparathyroidism is revealed as a demineralization of the entire skeletal system. In the early stages of the disease the trabeculae of the bones are thinned out and become delicate in structure. As resorption of calcium progresses the trabeculae become indistinct in outline and the cortical bone becomes so thin that the bones have a homogeneous ground-glass appearance. This has been referred to as the osteoporotic form of hyperparathyroidism and is indistinguishable from the osteoporosis of osteomalacia, hyperthyroidism, and particularly senile osteoporosis. In such cases complete metabolic studies and even biopsy may be necessary to establish the presence of hyperparathyroidism. As the disease progresses into the more classic form (von Recklinghausen's disease or generalized *osteoïtis fibrosa cystica*), the osteoporosis develops a characteristic, uniform, miliary, granular appearance that is distinct from the ordinary type of osteoporosis associated with acute and chronic disease of bone and with neurotrophic conditions. It is best exhibited in the flat bones, especially the calvarium, where it may be closely simulated by the osseous changes accompanying the blood dyscrasias of childhood, renal rickets, and occasionally multiple myeloma. In many regions the decalcification progresses and produces multiple cystic lesions (*osteoïtis fibrosa cystica generalisata*) of varying size,

which may be found within the medullary portion or below the periosteum. The jaws, pelvis, long bones, ribs, and metatarsal and metacarpal bones are favourite sites for such changes. The subperiosteal zones of resorption are especially well shown at the ends of long bones and in the phalanges. Cysts may reach a large size, and locally may simulate a giant-cell tumour, although the expansion of the cortex which is so common in the latter is generally less marked in hyperparathyreoidism. Pathological fractures through the cystic regions are common. Because the bones are soft, bowing, fractures, kyphosis, narrowing of the pelvis, *cava varo* and deformities of the ribs are common. Following the removal of the cause of hyperparathyreoidism (tumour or primary hyperplasia), a very obvious change occurs in the structure of the skeletal system. As the resorption of calcium is arrested the trabeculae of bones lose their indistinct outline and become well defined. As convalescence occurs, the density of the bone gradually approaches the normal, although such deformities as bowing, kyphosis and scoliosis will persist. Cystic regions gradually become filled in with bone and may disappear completely.

PHYSICAL THERAPY.

Adenocarcinoma of the Oral Cavity.
WILLIAM L. WATSON (*The American Journal of Roentgenology*, July, 1935) describes adenocarcinoma of the oral cavity. These tumours have a predilection for the hard and soft palate because of numerous salivary-secreting glands, with especially large groups in hard and soft palates, cheeks and base of tongue. The author presents a series of 41 intraoral adenocarcinomata studied in detail from a clinical point of view. These tumours are, in the majority of instances, derived from the minor salivary glands of the oral cavity, but may arise from aberrant thyreoid tissue or from mucous glands. The micropathology is only fairly constant, but the gross appearance of these tumours is diagnostic. Clinically, these growths have a tendency to local recurrence, bone invasion, and widespread metastases by way of the blood or lymph stream. Their radiosensitivity could not be definitely forecast by the microscopic picture, but clinically, with one or two exceptions, this group was quite radio-resistant. Present treatment is by a combination of external and interstitial irradiation, followed by cautery excision. The prognosis is poor.

X Ray Therapy in Graves's Disease.

GUNSETT, SEEGER, RITTER AND SCHNEIDER (*Journal de Radiologie et d'Electrologie*, December, 1935) tabulate one hundred patients with Graves's disease treated by X radiation. Of

this number the relation was eighty-four women to sixteen men. Eighty-three patients were treated at least five years previously, some as far back as 1919. Forty-four patients presented themselves to the clinics at Strasburg for reexamination, and of these, thirty-two, or 72.7%, were found to be in excellent health, complained of no trouble whatsoever and for many years had resumed their normal social activities. Eight patients still have some symptoms of the disease; three cases are considered to be failures, and in one instance operation was necessary six months after X ray treatment. Of the fifty-six persons who were unable to attend for review but who wrote to the authors regarding their condition, forty-two, or 75%, stated that their health was excellent. Four patients said they were considerably better, whilst in ten there was apparently no improvement. Taking the hundred patients in all, the authors consider that seventy-four have been returned to a normal state of health by X radiation alone. In all these cases it is at least five years since treatment was given, and in a greater number of them ten to twelve years. The technique used in the last twelve years has been 200 kilovolts with a filtration of 0.5 millimetre of copper; three fields have been irradiated and the dose varied very largely according to the case. The length of treatment has also varied considerably, the minimum period being fifteen days and the longest three months during which treatment has been applied.

Treatment of Erysipelas with Ultra-Violet Radiation.

M. E. KNAPP (*Archives of Physical Therapy, X-Ray, Radium*, December, 1935) quotes 415 patients suffering from erysipelas who were treated at Minneapolis General Hospital. Of these, 340 were treated with ultra-violet rays alone. The technique followed was to double the erythema dose with the lamp about 20.0 centimetres (eight inches) distant from the patient, in order to get as high as possible a concentration of the shorter wave-lengths. A margin of 2.5 to 7.5 centimetres (one to three inches) around the lesion was included in the treatment. When multiple exposures were necessary, the edges were allowed to overlap. Local applications of cooling packs were used occasionally, but as a general rule none were used after treatment. The majority of patients remarked about the grateful feeling of relief which accompanied the treatment; often they spoke of it while the lamp was still being applied. Later, there was some increased oedema of both the area of erysipelas and the surrounding normal skin. This subsided in twenty-four to forty-eight hours, and if no further spreads or complications occurred, the temperature dropped rapidly to normal, the treated area wrinkled, then desquamated, and in five or six days the entire area was replaced

with fresh-looking skin. The patients were usually discharged from hospital before desquamation was completed. In the great majority of cases only one treatment was needed. In this series 254 patients, or 74.7%, were given only one ultra-violet treatment; 71, or 20.8%, were given two treatments, and the remaining 15% were given three to five treatments. The average number of treatments per case was 1.3. In the group treated by ultra-violet radiation alone there were twenty-eight deaths. Of the twenty-eight patients, twelve were admitted to the hospital for some other condition and the erysipelas developed as a complication. All of these patients developed their erysipelas while in the hospital. Only nine of the patients who died were admitted for erysipelas alone, and these all had facial erysipelas. One of these was found to have *diabetes mellitus* with diabetic acidosis. Two patients developed an oedema of the larynx, of whom one required tracheotomy. Eighteen of the deaths were in patients over sixty years of age. Six of these were over eighty years of age. The only death in a child was in one of two years. Although there were seven patients under one year of age in this series, none of them died while the erysipelas was present.

Acute Pulmonary Tuberculosis as a Complication Following Radiotherapy for Cancer of the Larynx.

S. KADRNKA AND P. BARDET (*Journal de Radiologie et d'Electrologie*, January, 1936) quote a series of thirteen cases in which, after intensive X radiation had been given to pharyngeal or laryngeal tumours, the patient died from either bronchopneumonia, pulmonary gangrene or acute pulmonary tuberculosis. The first two maladies can well be understood as possible complications from an ulcerating and advanced septic condition of the lower air passages. It is with the last condition that the authors in particular deal. They cite four cases in which, after prolonged X radiation, an apparent quiescent tuberculous infection of the apices of the lung has become active. Radiographic examination of all cases had previously been performed and fibrotic, apparently old, healed tuberculous lesions had been found. The authors state that radiotherapy to tuberculous glands and even to a chronic fibrotic type of pulmonary tuberculosis has always been found beneficial. They ascribe this exacerbation of the apical lung condition, not to the direct effects of irradiation on the old tuberculous lesion, but to the concomitant loss of weight, dysphagia and general cachexia which must follow the epidermitis and tracheitis and general inflammation that surround the oesophagus and other tissues of the neck. The matter appears mainly of academic interest, as in advanced pharyngeal carcinomata irradiation is only a palliative procedure.

Medical Societies.

THE MELBOURNE PÆDIATRIC SOCIETY.

A MEETING of the Melbourne Pædiatric Society was held at the Children's Hospital, Melbourne, on May 13, 1936. The meeting took the form of a series of clinical demonstrations.

Retarded Development.

DR. ROBERT SOUTHBY showed a female baby, ten months of age, an only child, who had been born at full term; the delivery was normal and non-instrumental. The baby was breast-fed for one month, after which she had cow's milk, and she had recently been having light baby diet. The sister at the health centre advised medical attention, as she considered that the infant was backward. The parents were both healthy and the family history appeared to be clear of any mental degeneration. During the first few weeks after birth the baby had had a nasal discharge and, at the age of six months, a small abscess on the leg. She had always been a fat baby, and the tongue had protruded noticeably. She was still unable to sit up or even to support her head firmly, and was a very placid and amiable child. She was not cretinoid or mongolian; there had not been any troublesome constipation or umbilical hernia or supraclavicular pads of fat. She could smile and seemed quite contented. Dr. Southby had noticed that she was not attracted by bright light, and thought that the vision was defective. Dr. Mark Gardner saw the baby and suggested the presence of buphthalmos. He described the optic disks as pale, with irregular pigmentation in the retina. The urine did not contain albumin or sugar, and the blood serum had not yielded the Wassermann reaction; the anterior fontanelle was widely open, and, though the reflexes were all present, there was generalized muscular atonicity. Dr. Southby put forward the suggestion that the retarded mental development might be due to an intracranial haemorrhage at birth. He said that though the patient had been flaccid at first, it was possible that later she might become spastic.

DR. A. P. DERHAM said that it was impossible to prove the cause of the condition, and he thought that the baby was "just an idiot"; it was true that some of these babies were blind or partially blind; he regarded the infant as an example of the unclassifiable group of mentally deficient.

DR. F. KINGSLEY NORRIS said that he did not think the child could see, but he doubted whether she was an idiot; the mental retardation might be due to sense deprivation. He would like the baby's condition to be reported in a year's time.

DR. IAN WOOD said that he did not think the baby was blind, nor did he like to classify the condition as due to birth trauma; he regarded it as due to lack of cerebral development, and because of this under-development she appeared not to be able to see.

DR. W. W. McLAREN thought that too much stress was laid on birth injury as a cause of mental retardation. The mother was quite definite that the child could see. He thought that injury from the use of forceps was grossly exaggerated.

Dr. Southby, in reply, said that he would be pleased to report progress. He was satisfied that by no means all the intracranial birth hemorrhages were due to the foetus being severely handled by the obstetrician; indeed, he had come across examples in which no interference had occurred and the birth had been quite easy. The baby's sight was definitely impaired; she would not clutch at objects or respond to the presence of a glistening object or a bright light.

Congenital Oesophageal Obstruction.

DR. J. W. GRIEVE showed a boy, six years of age, who weighed only 12.6 kilograms (two stone). He was born a month prematurely and weighed 2.81 kilograms (six pounds four ounces) at birth. He was a breast-fed baby, but commenced to vomit at the age of two days and had vomited almost every day ever since. At six weeks of age he had been admitted to the Children's Hospital for investigation to exclude pyloric stenosis, but had been taken out of the hospital before a definite diagnosis was made. The vomiting had persisted to one year of age, at which time it became established that he could not swallow solid food, though he might keep liquids down, and this state of affairs still existed. He vomited after nearly every meal, and the vomited material consisted of the food he had taken at the previous meal in an undigested state and mixed with mucus and clear water; it did not have the usual sour smell of vomited material. On occasions he had considerable bouts of vomiting, at the end of which brownish mucus would be noticeable in the vomitus. He was always hungry, but had never thrived. His height was only 105 centimetres (three feet six inches) at six years of age; he was emaciated and his skin was dry; his face had a pinched appearance. Apart from nasal obstruction and the presence of a narrow, high palate, no other abnormality was detected. On May 7, 1936, Dr. Colin Macdonald reported, on examination of the skiagram of the chest, the presence of a sausage-shaped shadow in the central area behind the lower half of the cardiac shadow. On examination by means of a barium meal it was found that this shadow was due to a dilated oesophagus, the point of stricture lying approximately at the level of the oesophageal opening in the left hemi-diaphragm. Fluids passed fairly easily through this constriction, and a short length of tortuous oesophagus below the stricture suggested that the narrowing was a congenital organic lesion rather than a neuro-muscular cardiospasm. The evidence was against diaphragmatic herniation, diverticulum or thoracic stomach.

Dr. Grieve said that the child was very bright mentally and that he would like to hear expressions of opinion concerning the treatment.

DR. H. C. COLVILLE concurred in the diagnosis of a congenital stricture rather than a cardiospasm in so young a child, and considered that the treatment was surgical and should be attempted soon. He recommended retrograde dilatation after the method of Gabriel Tucker. A preliminary gastrostomy was necessary to ameliorate the swollen state of the oesophageal mucosa. Later, a thread would have to be passed through the stricture to draw graduated weights in through the stomach and out through the mouth. The difficulty arose in the passage of the thread through the stricture. One method employed was to attach it to a small lead shot which was swallowed; but in the case under consideration the pinhole opening was probably to one side and not at the bottom, and the small weight would be unlikely to find the opening. If this were the case, the best method would be the passage of a very small bougie, such as a ureteric catheter, under direct vision, through an oesophagoscope.

DR. DOUGLAS GALBRAITH said that the term congenital atresia was more properly applied to the condition in which the upper end of the oesophagus ended in a blind pouch and the distal portion opened in the trachea; all other instances of narrowing of the oesophagus, apart from those following injury, might be classed together under the term "congenital stenosis". Dr. Galbraith's own interest in the condition dated back some years to the time when he was resident medical officer to Dr. Leonard Findlay. Dr. Findlay and Dr. Brown Kelly at that time investigated a series of cases and put forward the suggestion that some of them were due to a congenitally short oesophagus and that the constricted portion was the abnormally situated cardia. This conclusion had been arrived at partly as a result of endoscopic examination and the obtaining of gastric mucosa from the area below the constriction. Findlay and Brown Kelly suggested that

the causes of congenital oesophageal stenosis could be placed in the following groups: (a) simple narrowing of the gullet, due to improper vacuolation of the oesophageal wall; (b) membranous diaphragm; (c) fibrous or fibromuscular thickening of the wall of the oesophagus; (d) congenitally short oesophagus; (e) spasm of the oesophagus; (f) cardiospasm, or achalasia of the cardia. Dr. Galbraith commented that, to his mind, an important point was their conclusion that it was not possible to diagnose the particular type of obstruction (narrowing, spasm or membranous diaphragm) without endoscopic examination; the radiographic pictures of all types of stenosis were identical. With reference to the cases in which spasm was the main feature, Dr. Galbraith wondered if there might be some biochemical change underlying the condition. The present treatment of the spasm associated with peptic ulcer by a histidine compound, such as "Larostidin", was based on the occurrence of such changes. It was known, too, that in pyloric stenosis there were definite changes in the blood chemistry and, in spite of the excellent results that were being obtained by surgery in this hospital in the treatment of pyloric stenosis, Dr. Galbraith felt that treatment by injections of "Larostidin" as a means of correcting the abnormal blood chemistry and of reducing the element of spasm would be well worth trying.

DR. REGINALD WEBSTER referred to a patient at the hospital who had come to autopsy with a similar condition. He had been faced with the impossibility of reconciling the report on the skiagram with the appearances found at autopsy. Where the stricture was supposed to be, there had been merely a little thickening, which could not be compared in size with an average specimen of hypertrophic pyloric stenosis. Serial sections would need to be prepared to determine where the oesophageal and gastric mucosæ met.

DR. W. KENT HUGHES agreed that a gastrostomy should be performed, but, if any dilatation were done, it should be carried out very slowly. The main essential of the treatment was to go slowly; he would advise that even so small a bougie should be passed and that it should be left *in situ*.

DR. IAN WOOD said that he understood that, unlike the traumatic stricture, a congenital stricture had a tendency to contract. He would like to ask Dr. Colville whether treatment would have to be carried on throughout life or if it was advisable to consider a reconstruction of the oesophagus.

In reply, Dr. Colville said that one patient of his had been regarded as cured clinically for four years; occasionally he got what he called a "choking", presumably due to spasm at the site of stricture.

DR. GRIEVE said that he was glad that his presentation of the patient's case had created such a good discussion. He had noted that Beattie had reported fifty-four cases in 1927, including four of his own, and had separated them into a higher group and a lower group. Beattie had stated that he was averse to doing anything to congenital atresia, as they tended to recur.

Slipped Capital Femoral Epiphysis.

DR. JOHN COLQUHOUN showed a girl, twelve years of age, with slipped capital femoral epiphysis. In February, 1936, for the first time, she had complained of pain in the right hip, going down towards the right knee. The doctor who was consulted had made her rest, with relief of symptoms, but they had recurred when she got up. There was no history of trauma, but on close questioning the girl suggested that the onset might have been associated with pushing a scooter. The examination strongly suggested the presence of tuberculous disease of the hip joint, but the radiographic evidence enabled the diagnosis of slipped epiphysis to be made. Dr. Colquhoun said that the routine treatment, when he was at the Massachusetts General Hospital in 1926, and since then, had been a very limited manipulation and, if this was not sufficient, an open operation by the Smith-Petersen method. A report

had been published of seven patients treated by the open operation with good results and advocating the procedure. In the case of the present patient Dr. Colquhoun thought that early manipulation had failed because it had been applied too suddenly, so he had tried the effect of continuous traction; in two weeks there was almost complete anatomical restoration, but though the position was quite good, as could be seen by the skiagram presented, some *cossa vara* was present, and he decided to carry out a manipulation. Jahss had said that the limbs of these patients should not be put up in true extension, but with 30° of flexion and with a maximum amount of internal rotation. Dr. Colquhoun had applied plaster in this manner and the skiagram showed a meticulously accurate reposition of the head. The most recent skiagram showed that the position had been maintained. Dr. Colquhoun had cut windows out over the quadriceps area and over the flexors of the foot; a little active movement of these muscles was thus rendered possible.

Dr. Colquhoun commented that this condition was sometimes called acquired or adolescent traumatic *cossa vara*, because it was not recognized until definite irreducible deformity was present; but, like so many other bone conditions, the prognosis had been completely altered by the use of skiagrams, so that now slipping or slipped capital femoral epiphysis was a better descriptive term. Little was known of the pathology, but there was no evidence of an infective basis; for some reason or other there was a lesion of the tissue at the epiphyseal line. Some thought that this was metabolic and the result of some endocrine disturbance; the condition occurred at the age of puberty, when the endocrine balance was greatly upset. Harry Platt, of Manchester, and Fröhlich had favoured low grade sepsis as the cause, but Dr. Colquhoun thought that this term was indefinite and unscientific.

Three types of young individuals were affected: (i) Those of the *dystrophia adiposa* of the Fröhlich type; four out of Wilson's eight patients had belonged to this group. (ii) The long, slender or asthenic type of Goldthwait; these children were growing rapidly at the twelfth or thirteenth year and were long and thin. (iii) An indiscriminate group that could not be classified under either of the other two headings.

Dr. Colquhoun commented further that boys were more frequently affected than girls, and the left side more often than the right. There was usually a history of pain in the hip in the early stages, with some limitation of movement and mild muscle spasms on rotation; there might be a history of trauma, but this was not a prominent feature. Brailsford had quoted a case in which the symptoms had been present for as long as four years, but this was unusually long. When the condition was established there was limitation of all hip movement and definite muscle spasm (especially on rotating the hip), accompanied by many other signs.

The girl shown by Dr. Colquhoun had been treated for two weeks by fixed traction in a Thomas splint with Spanish windlass and, later, in plaster of Paris in the Jahss position for three months; the prognosis was excellent. Dr. Colquhoun said that the case presented several interesting features. The patient was a girl and could not be classified in any of the common groups; the condition was not associated with trauma; almost complete reduction had been obtained by traction in a Thomas splint, and perfect reduction by manipulation. The position advised by Jahss had been found to give this reduction, in contrast with the imperfect reduction by the Whitman position; and the plaster had been cut out over the quadriceps and foot flexors to enable the patient to carry out active movements of these muscle groups.

DR. C. H. OSBORN congratulated Dr. Colquhoun on the result and considered that it merited recognition as a new method of treatment for the condition known as slipped epiphysis. It was quite likely that many of these cases were associated with a disease producing hyperæmia of the metaphysis due to toxic bacterial or chemical causes and allowing slipping of the epiphysis to occur. He would like to see the patient again in three or four months. In

his experience of subcapital fracture he was convinced that one was liable to be led astray by an antero-posterior skiagram, and he would like to see a good lateral film of this patient.

DR. D. O. BROWN also considered that the result was very excellent, especially when contrasted with some appalling late results of neglect of treatment Dr. Brown had seen in the out-patients' department. He regarded the condition as an osteochondral dystrophy. Dr. Brown was distinctly impressed with the idea that simple traction might materially improve this condition, and it was hard for him to conceive that an operation should be the usual treatment.

DR. ROBERT SOUTHBY could not understand why, after extension for two weeks had given such a good result, the manipulation was necessary, and asked Dr. Colquhoun how long the plaster would be left on. Dr. Southby recalled that R. Hamilton Russell had allowed weight-bearing after only three months.

In reply, Dr. Colquhoun stated that the patient would be held in plaster for three months and on removal of the plaster further skiagrams would be taken, the results of which would be used for guidance in the later treatment. Dr. Colquhoun thanked those who had contributed to the discussion, and referred to the opinion of Phillip Wilson that surgical reposition of the slipped capital epiphysis gave much better results than manipulative treatment; unless the head sat well on top of the femur progressive *coxa vara* ensued. In the old days, at the Shropshire Orthopaedic Hospital in Liverpool, *coxa vara* was sometimes seen almost down to 90°. Dr. Colquhoun regretted that at the Children's Hospital there was neither a curved cassette that could be placed up in the crutch, nor a portable radiographic unit to get a suitable lateral skiagram. He thought that these aids to accurate work should be obtained.

Fungus Infection of Mouth and Feet.

DR. W. W. MCLAREN showed a girl, five years and two months of age, who had had a chronic inflammation of the toes and finger nails with glossitis, and involving the mucous membranes of the cheek, for two and a half years. The onset had been an acute stomatitis and gingivitis, and the mouth had remained sore. The general condition had indicated some chronic infection, as the child was pale, with a poor appetite and occasional diarrhoea. A smear from the tongue revealed a mycelium from a fungus which was not ordinary thrush, and Dr. Reginald Webster had prepared a culture on Sabouraud's medium (1% glucose agar), but the culture would take twenty days to grow. A test meal had proved the absence of free hydrochloric acid in the gastric contents. The child still had a paronychia of one thumb, which had been present for two years; the toes had responded to treatment with Whitfield's ointment, but the mouth did not respond. Dr. Ivan Connor had informed Dr. McLaren that 0.45% of para-nitro-phenol in spirit could be regarded as a specific. This was being painted on the child's tongue several times a day and some improvement had occurred.

DR. ROBERT SOUTHBY asked Dr. McLaren if he had administered dilute hydrochloric acid therapeutically, and Dr. McLaren replied in the negative.

Tuberculous Disease of the Ischium.

DR. D. O. BROWN showed a patient, seven years and nine months of age, who, for about one year before admission to the orthopaedic section of the Children's Hospital, on July 15, 1934, had been complaining of pain in the right knee and since then had walked with a limp and outward rotation of the leg. In April, 1933, he had had a minor injury to the right knee. A skiagram taken on April 12, 1934, revealed the presence of a destructive lesion of the right pubis and ischium, extending to the acetabulum. Nothing abnormal could be detected in the surface anatomy and there was no shortening; but, on attempts to flex the hip joint in the adducted position,

there was some limitation of movement, though not on flexion in the abducted position, and the movement of extension was good. Dr. Colin Macdonald had expressed the opinion that the appearances in the film suggested to him a tuberculous rather than a pyogenic origin. Blood sedimentation tests, carried out at Frankston, gave results that were within normal limits, and tuberculous cases usually showed higher figures. Dr. Brown, however, regarded the lesion as tuberculous because the Mantoux test gave a positive reaction and the boy's mother had tuberculosis. He was kept recumbent for a considerable period and, though the skiagram taken on October 29, 1934, showed increased destruction of the ischium and pubis, he became entirely free of signs and remained symptomless. In a recent skiagram it was seen that further extensive destruction had occurred, which was maximal at the tuberosity, and that there was a calcifying cold abscess behind the pelvic fascia. Dr. Brown commented on the gross discrepancy between the appearances in the films and the clinical condition of the patient, and invited expressions of opinion as to what should be done to the boy at that stage.

DR. J. G. WHITAKER remarked that tuberculous disease of bone not involving the joint was very uncommon in Australia and that, as the condition did not involve the joint, many clinical signs would not be expected. He recommended that weight-bearing should be reduced to a minimum over as long a period as was indicated from a series of skiograms.

DR. JOHN COLQUHOUN said that he had watched this patient with interest at Frankston. The boy had definitely developed a calcified abscess travelling proximally while he was recumbent; this development was very rare, apart from tuberculous disease of the spine. Another point was the behaviour in the blood sedimentation tests, which had been used considerably at Frankston as a reliable test of activity of the lesion. If the child was able to run about without loss of weight or any rise in temperature, Dr. Colquhoun thought that he should be allowed to do so.

DR. M. KENT HUGHES doubted whether the series of skiograms indicated progressive destruction; he thought that they indicated progressive healing; if this were so, it would be in keeping with the clinical improvement.

In reply, Dr. Brown recalled that in 1926 Dr. Upjohn had explored a similar condition at operation and the patient got lardaceous disease and died. Dr. Brown had formed the opinion that the prognosis of tuberculous disease in that situation was bad, and it had been a surprise to him to find the condition so quiescent in this patient. No recent blood sedimentation rate test had been done and he would ask Dr. Webster to do it shortly. Dr. Macdonald had regarded the appearances in the recent skiograms as stationary, though Dr. Brown thought he could discern changes indicative of healing. Dr. Brown intended to put the patient at rest in bed without splints for a period of six months and to determine his further course of action on the appearances in future films.

Melena from Meckel's Diverticulum.

DR. J. G. WHITAKER showed a boy, thirteen years of age, upon whom he had operated because of recurrent severe melena.

DR. J. W. GRIEVE gave an account of the pre-operative history. The boy was admitted to the Children's Hospital on April 12, 1936, in a state of collapse. On the previous day the illness had commenced suddenly, and on the day of admission the collapse was associated with severe melena, further evidence of which was obtained on the day following. Apart from the collapse, nothing else could be discovered on careful examination. Some two months earlier he had complained of transient post-prandial pain, but in other respects he seemed to be perfectly normal until the sudden onset of the present illness. After two more attacks of melena and transfusions of blood his condition improved considerably. Dr. Grieve thought he could exclude duodenal ulcer and local bowel conditions other than Meckel's diverticulum as the cause

of the loss of blood, and he had handed the patient over to Dr. Whitaker for operation.

Dr. Whitaker said that this patient was the third in ten years upon whom he had operated for melena, the source of which was a Meckel's diverticulum; the other two had been operated on in 1927 and in 1932 respectively. Although one of his patients was a girl, the disease was regarded as one peculiar to boys; the symptoms occurred typically between the ages of ten and twelve years, and the condition was usually accompanied by some other congenital abnormality. It was of interest that the doctor who had sent the patient to the Children's Hospital (Dr. Grieve), the resident medical officer and Dr. Whitaker had all made a correct pre-operative diagnosis, so that, although the condition was rare, it was by no means difficult to suspect its presence.

Before the operation the patient received a transfusion of blood. Dr. Whitaker commented that though ten donors appeared to be incompatible when the blood specimens were mixed directly on cold glass slides, several of them proved to be compatible when the slides were kept warm. At operation the Meckel's diverticulum was found and the bowel below it was full of blood, though there was no blood above the diverticulum. Dr. Whitaker removed the diverticulum and invaginated the stump, but he remembered that the patient operated on in 1932 had died from post-operative obstruction at the site of invagination, and in the present case, as he was not satisfied with the lumen, he excised a small section of bowel and did a lateral anastomosis above and below the part. Another point of interest was that the ulceration in Meckel's diverticulum occurred at the portion nearest the base, and it would be quite possible to turn a little of this in and subsequently the patient might have further bleeding. When these facts were taken into account, it appeared to Dr. Whitaker that it was quite reasonable to excise the portion of bowel containing the Meckel's diverticulum and to do an anastomosis. The course in this case after operation was quite uneventful, and Dr. Whitaker felt that it was an interesting case, even if it served only to indicate the wisdom in similar circumstances of thinking of bleeding from a Meckel's diverticulum.

DR. REGINALD WEBSTER commented on the pathological points of interest. The condition under discussion came under the heading of heterotopia or ectopia, both of which terms signified displacement or abnormal situation of portions of the body. The abnormalities were not constant; in one of Dr. Whitaker's examples of Meckel's diverticulum Dr. Webster had found duodenal cells beneath the *muscularis mucosae* and had recognized Brünner's glands and oxytic cells. In the present example the main features were: (a) the presence of an ulcer right at the point of junction with the bowel; (b) some rugous mucous membrane similar to *valvulae conniventes*, which was regarded as peculiar to the duodenum and upper part of the jejunum and were out of place in the ileum; (c) a little tumour consisting of a definite and unmistakable pancreatic tissue, which was probably the source of the tryptic ferments that caused the ulceration. Dr. Webster emphasized that there was no reason to expect any constancy as to what the remnants might be, and that in fact the condition might be regarded as an example of an embryological misdeal.

Unusual Ossification.

DR. H. L. STOKES showed two patients with unusual ossification. One was a boy, fourteen years of age, who was seen by Dr. Stokes at the Children's Hospital in November, 1935, because of limp at the left hip of two months' duration. Though there were slight pain and localized tenderness, no other abnormal signs were detected upon examination. Apart from a slight narrowing of the joint space, the skiagram was inconclusive, but in another skiagram taken in April, 1936, there was evidence of peculiar ossification in the ischial rami which was suggestive of pathological changes. Dr. Colin Macdonald did not think that the appearances represented any disease

process, and the boy's subsequent history had been uneventful and he no longer had any limp or disability.

The other patient shown by Dr. Stokes was a boy, aged seven years, with definite asymmetry in the chest, which had worried the boy's mother but had not caused the child any distress. In the skiagrams which Dr. Stokes produced and which had been taken at an interval of five months, there was a definite widening of the anterior end of the fifth rib on the left side. Dr. Macdonald had ascribed the appearances to an abnormal development of the bone, and said that there was no evidence of trauma or of any inflammatory condition.

Pathological Specimens.

DR. REGINALD WEBSTER presented an interesting series of pathological specimens. These included an example of meningo-myelitis from a boy who had come into hospital with paraplegia and other signs and symptoms which had led to a provisional diagnosis of poliomyelitis. A diffuse fusiform bronchiectasis had occurred in a child who was the subject of coeliac disease and who developed dilated bronchi, peribronchial fibrosis, enormous hilar glands and terminal bronchopneumonia, all of which were admirably demonstrable in the specimen. A cerebral tumour was well defined and not infiltrated, occupying a central position in the cerebellum. Dr. Webster said that it had been shown microscopically that this tumour was not an ordinary glial tumour, but was more in the nature of a teratoma like Wilm's embryo, and was very malignant. It was noteworthy that the cerebro-spinal fluid chlorides were very high in this case and amounted to 980 milligrammes per 100 cubic centimetres. Dr. Webster stated that he had had two former experiences of this nature, in which the patients had died in a uræmic state and in which the blood urea estimations had ranged between 200 and 400 milligrammes per 100 cubic centimetres. He had therefore estimated the urea content of the cerebro-spinal fluid of the blood in this case and got calculations of 82 and of 62 milligrammes respectively. Before death the chloride estimations had returned to normal and there had been no renal basis for the high chloride estimation. Another specimen demonstrated by Dr. Webster illustrated the nephritis that frequently complicated pneumonia, in which the sequence of events was pneumonia, empyema, streptococcal peritonitis and acute nephritis. Another specimen was the spleen of Banti's disease, which showed visible trabeculae, gross fibrosis, great reticulo-endothelial proliferation and hyperplastic Malpighian corpuscles, which were widely separated. Dr. Webster commented that the child was very well and that no evidence of cirrhosis of the liver had been found on inspection at operation or on histological examination of a small portion of the liver which had been excised.

Obituary.

CHARLES EDWARD MARSDEN.

WE regret to announce the death of Dr. Charles Edward Marsden, which occurred on May 13, 1936, at St. Kilda, Victoria.

New Medicaments, Apparatus, etc.

In this section attention of readers will be directed to new medicaments, apparatus *et cetera* referred to in THE MEDICAL JOURNAL OF AUSTRALIA ADVERTISER.

"NEO-SYNEPHRIN HYDROCHLORIDE."

"NEO-SYNEPHRIN HYDROCHLORIDE" is the name given to levo-methoxyethanolphenol hydrochloride put forward by Frederick Stearns and Company. It has a vaso-constrictor application similar to that of epinephrine and ephedrin. The manufacturers claim that it possesses certain advantages in that, *inter alia*, it produces no side

effects. It is made available as a solution, an emulsion and a jelly; and will shortly be referred to in THE MEDICAL JOURNAL OF AUSTRALIA ADVERTISER. The drug, after due inquiry, has been accepted by the Council on Pharmacy and Chemistry of the American Medical Association.

Books Received.

BAILLIÈRE'S SYNTHETIC ANATOMY, by J. E. Cheesman, with foreword by J. E. Fraser, F.R.C.S.; 1936. London: Baillière, Tindall and Cox. Crown 4to. Price: 45s. net.

RECENT ADVANCES IN DERMATOLOGY, by W. N. Goldsmith, M.A., M.D., M.R.C.P., with foreword by A. M. H. Gray, M.D., F.R.C.P., F.R.C.S.; 1936. London: J. and A. Churchill Limited. Demy 8vo. pp. 537, with illustrations. Price: 18s. net.

MODERN HOME MEDICAL ADVISER: YOUR HEALTH AND HOW TO PRESERVE IT, by various authors, edited by Morris Fishbein, M.D.; 1935. New York: Doubleday, Doran and Company, Incorporated; Sydney: Virtue Book Company. Super royal 8vo, pp. 936, with illustrations. Price: £2 5s.

COMBINED TEXT-BOOK OF OBSTETRICS AND GYNAECOLOGY: FOR STUDENTS AND MEDICAL PRACTITIONERS, by J. M. Munro Kerr, M.D., F.R.C.S., F.R.C.P., F.C.O.G., J. Haig Ferguson, M.D., M.R.C.P., F.R.C.S., F.R.C.P., F.C.O.G., F.R.S., James Young, D.S.O., M.D., F.R.C.S., F.C.O.G., James Hendry, M.B.E., M.A., B.Sc., M.B., F.R.F.P., and S., F.C.O.G., with contributions from Charles McNeil, M.A., M.D., J. Duncan White, M.B., Ch.B., D.M.R.E.; Second Edition, revised, rewritten and enlarged; 1935. Edinburgh: E. and S. Livingstone; Sydney: Virtue Book Company. Royal 8vo, pp. 1112, with 497 illustrations and additional X-ray plates. Price: £2 10s.

Diary for the Month.

JUNE 9.—Tasmanian Branch, B.M.A.: Branch.
 JUNE 9.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
 JUNE 12.—Queensland Branch, B.M.A.: Council.
 JUNE 16.—Tasmanian Branch, B.M.A.: Council.
 JUNE 16.—New South Wales Branch, B.M.A.: Ethics Committee.
 JUNE 17.—Western Australian Branch, B.M.A.: Branch.
 JUNE 18.—New South Wales Branch, B.M.A.: Clinical Meeting.
 JUNE 23.—New South Wales Branch, B.M.A.: Medical Politics Committee.
 JUNE 24.—Victorian Branch, B.M.A.: Council.
 JUNE 25.—South Australian Branch, B.M.A.: Branch.
 JUNE 25.—New South Wales Branch, B.M.A.: Branch.
 JUNE 26.—Queensland Branch, B.M.A.: Council.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser", pages xx, xxi, xxi.

BLAIR ATHOL DISTRICT HOSPITAL, BLAIR ATHOL, QUEENSLAND: Medical Officer.

FREMANTLE HOSPITAL, FREMANTLE, WESTERN AUSTRALIA: Junior Resident Medical Officer.

HOBART GENERAL HOSPITAL, HOBART, TASMANIA: Surgeon-Superintendent.

MACKAY HOSPITALS BOARD, MACKAY, QUEENSLAND: Resident Medical Officer.

MOOROOPNA HOSPITAL, MOOROOPNA, VICTORIA: Junior Resident Medical Officer.

PERTH HOSPITAL, PERTH, WESTERN AUSTRALIA: Resident Pathologist and Biochemist.

THE BROKEN HILL AND DISTRICT HOSPITAL, BROKEN HILL, NEW SOUTH WALES: Senior Resident Medical Officer.

THE HORNSBY AND DISTRICT HOSPITAL, HORNSBY, NEW SOUTH WALES: Honorary Officers.

THE PUBLIC SERVICE BOARD, NEW SOUTH WALES: Senior Medical Officer.

THE WOMEN'S HOSPITAL, CROWN STREET, SYDNEY, NEW SOUTH WALES: Junior Resident Medical Officer.

THE UNIVERSITY OF SYDNEY, SYDNEY, NEW SOUTH WALES: Fellowship in Urology.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

| BRANCHES. | APPOINTMENTS. |
|--|---|
| NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney. | Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phoenix Mutual Provident Society. |
| VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne. | All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria. |
| QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane. | Brisbane Associate Friendly Societies' Medical Institute. Proserpine District Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY Hospital are advised, in their own interests, to submit a copy of their Agreement to the Council before signing. |
| SOUTH AUSTRALIAN: Honorary Secretary, 207, North Terrace, Adelaide. | All Lodge appointments in South Australia. All Contract Practice Appointments in South Australia. |
| WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth. | All Contract Practice Appointments in Western Australia. |
| NEW ZEALAND (Wellington Division): Honorary Secretary, Wellington. | Friendly Society Lodges, Wellington, New Zealand. |

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